CHISHOLM'S HANDBOOK OF COMMERCIAL GEOGRAPHY

CHISHOLM'S HANDBOOK OF COMMERCIAL GEOGRAPHY

ENTIRELY RE-WRITTEN BY

L. DUDLEY STAMP, D.Sc., B.A. (Lond.)

SIR ERNEST CASSEL READER IN ECONOMIC GEOGRAPHY IN THE UNIVERSITY OF LONDON AND DIRECTOR OF THE LAND UTILISATION SURVEY OF BRITAIN ; LATE PROFESSOR OF GEOGRAPHY AND GEOLOGY IN THE UNIVERSITY OF RANGOON

WITH MAPS AND DIAGRAMS

LONGMANS, GREEN AND CO.
LONDON ✦ NEW YORK ✦ TORONTO

LONGMANS, GREEN AND CO. LTD.
39 PATERNOSTER ROW, LONDON, E.C.4
CHITTARANJAN AVENUE, CALCUTTA
53 NICOL ROAD, BOMBAY
36A MOUNT ROAD, MADRAS

LONGMANS, GREEN AND CO.
114 FIFTH AVENUE, NEW YORK
221 EAST 20TH STREET, CHICAGO
88 TREMONT STREET, BOSTON

LONGMANS, GREEN AND CO.
215 VICTORIA STREET, TORONTO

BIBLIOGRAPHICAL NOTE

A HANDBOOK OF COMMERCIAL GEOGRAPHY
BY GEO. G. CHISHOLM

First Edition	*August* 1889
Second Edition	*May* 1890
Third Edition, revised	*May* 1892
Reprinted: *January* 1894, *October* 1896, *May* 1899, *June* 1900, *March* 1901, *April* 1902	
Fourth Edition, revised throughout and greatly extended	1903
Fifth Edition	1904
Sixth Edition	1906
Seventh Edition, revised throughout and extended	1908
Eighth Edition	*March* 1911
New Impressions: *July* 1913, *September* 1914, *June* 1915, *June* 1916, *January* 1918, *January* 1919, *and February* 1920	
Ninth Edition	*May* 1922
Tenth Edition, revised	*January* 1925

REVISED AND EDITED BY L. DUDLEY STAMP

Eleventh Edition	*January* 1928
Twelfth Edition, revised	*February* 1932

CHISHOLM'S HANDBOOK OF COMMERCIAL GEOGRAPHY
ENTIRELY RE-WRITTEN BY L. DUDLEY STAMP

First published	1937

Printed in Great Britain.

PREFACE

CHISHOLM'S Handbook of Commercial Geography was first published in August 1889. In his Preface to the first edition the author states that he has endeavoured to impart an 'intellectual interest to the study of the geographical facts relating to commerce,' and he refers to the address given by Mr. Goschen on his installation as Lord Rector of Aberdeen University in 1887, in which was stressed the importance of such intellectual interest with a view to success in business. The author states that he intends the work for three classes of persons, 'first, teachers who may wish to impart additional zest to their lessons in geography from the point of view of commerce; secondly, pupils in the higher schools and colleges that are now devoting increased attention to commercial education; and thirdly, those entering a commercial life, who take a sufficiently intelligent interest in their business to make their private studies bear on their daily pursuits.'

It is a remarkable tribute to the foresight of Chisholm that he judged aright ; for each of these three classes his book became a standard work and may justly be claimed a classic. Yet he wrote at a time when the University study of the subject was virtually unknown and when the school teaching of geography comprised mainly a wearisome repetition of lists of capes and bays, towns and products. In the course of thirty-six years after the first edition he supervised no fewer than twenty-three new editions and reprints, and the book underwent a process of steady growth and evolution. The huge task of incorporating the changes occasioned by the War fell to the author in his declining years, and after the appearance of the tenth edition in January 1925 he felt he could do no more. The remarkable vitality of the work led the publishers, with the author's agreement, to ask me in the autumn of 1926 to undertake a new revision. The eleventh edition accordingly appeared in 1928, and it was clear that the author derived keen pleasure from the fact that his child had found a foster-parent. It was intended that the next edition should be recast into almost a new work, but it was needed so urgently that another revision (the twelfth edition) appeared in 1932.

The work has now been virtually re-written from beginning to end, though I have endeavoured to retain as much as possible of the old Chisholm. Much can be learnt from the history of commercial development before the War, and it is for that reason that I have retained the old trade-tables from the Appendix, incorporating them in their appropriate places in the text but adding to them a new series of tables destined to show the post-War development of trade. In the same way the text will be found to include considerable sections of historical material and it is hoped thereby to counteract any tendency to facile correlations based only on the present position.

In the re-writing I have enjoyed the co-operation of my colleagues at the London School of Economics, including Mr. S. H. Beaver, who has revised part of the section on transport. The sections dealing with most of the chief countries of the world have been read critically by experts on the areas concerned and their names will be found mentioned in the appropriate places. In the preparation of the tables I have been helped by Mrs. E. Beaver, B.A., whose help is gratefully acknowledged ; whilst the index has been prepared by Miss D. M. Fisher, B.A., who did so much to help in the preparation of previous editions.

I trust that many old friends will find their varied suggestions incorporated and that both they and many new friends will continue to suggest alterations and improvements.

L. D. S.

LONDON SCHOOL OF ECONOMICS,
W.C. 2,
June 1937.

GEORGE GOUDIE CHISHOLM

M.A., B.Sc. (Edinburgh), Hon. LL.D. (Edinburgh)

1850–1930

The first forty-five years of his life George G. Chisholm spent in his native land of Scotland, labouring almost alone to build up a reputation for Geography. The subject had scarcely emerged from the eclipse which it suffered when the broad-minded philosophy of the cosmographers of the Middle Ages had passed into that petty collection of dull facts regarded as geography in the nineteenth century. It was characteristic of a man to whom 'inaccuracy was anathema' that he sought by the quality of precision to enhance the reputation of his subject. His early years were years of preparation, 'he never spared labour, and his unseen toil supplied much of the material on which others built more easily-earned reputations.' Thus Chisholm had reached his thirty-ninth year when his 'Handbook' was first published, and his forty-fifth when Longmans' Gazetteer of the World with its innumerable original references finally established his reputation. In the same year—1895—he left Scotland for thirteen years in London and became one of a line of distinguished geographers who have done much to advance this subject from Birkbeck College. In 1908 he became the first Lecturer in Geography in the University of Edinburgh, securing thus the first recognition of geography in that University. He then began to wield a great influence—as a lecturer to future teachers, later (though not till 1919) to B.Com. students and to those who sought the new post-graduate Diploma in Geography; as Secretary to the Royal Scottish Geographical Society and as Examiner to such bodies as the Institute of Bankers. In 1921 his work was recognised by the change of his post to that of Reader. Two years later, at the age of 73, he retired and received the highest academic honour the University could bestow—the Honorary LL.D.

Retirement allowed him to complete the belated post-War edition of his 'Handbook,' and it was not until later that I had the privilege of enjoying his personal friendship. He and his wife formed the habit then of coming south to enjoy the milder winter at Bournemouth, and it was the privilege of my wife and myself to

join them in a little dinner in a quiet London hotel on the occasion of his seventy-ninth birthday. In his unhurried, precise way he expressed his approval of the new edition of the 'Handbook' I had recently edited, and it was on that occasion that I promised, so far as lay in my power, that the work which had exercised so much influence on the progress of geography should not be forgotten by the English-speaking world. In less than a year Chisholm had passed away—in full possession of his faculties—suddenly—and but a few moments after the consultation of some work of reference in his well-stocked library in Edinburgh.

This book is dedicated to the memory of a master, the results of whose pioneer work we all enjoy. Its appearance is in fulfilment of a promise made to that master himself.

L. D. S.

CONTENTS

LIST OF MAPS AND DIAGRAMS

HANDBOOK
OF
COMMERCIAL GEOGRAPHY

INTRODUCTION

The great geographical fact on which commerce depends is that different parts of the world yield different products, or furnish the same products under unequally favourable conditions. Hence there are two great results of commerce: the first, to increase the variety of commodities at any particular place; the second, to equalise more or less, according to the facilities for transport, the advantages for obtaining any particular commodity in different places between which commerce is carried on. Among the difficulties of transport to be overcome we here include all the profits necessarily levied in the transference of goods from hand to hand (profits of exchange).

The variety of products in different places is due either to artificial production, whether by civilisation or manufacture, or to original distribution. The original distribution of minerals of economic value is an important matter for consideration in commercial geography, but under this head we must consider, not merely the latitude and longitude of the place of occurrence, but all the varied conditions, local, political, or historical, which help to render mineral deposits commercially available. Original distribution under the same provisos is likewise the prime consideration in the case of forest products, where the forests have not been planted by the hand of man.

In the case of cultivated products, soil and climate are considerations of first importance in determining the variety obtaining at different places. But even with reference to such products these are not the sole considerations. Facilities for finding a market, and all the conditions that affect these facilities, have also to be taken into account.

The cost, in labour, of bringing goods from one part of the world to another has been greatly reduced since the time of the earliest

commerce of which we can get a glimpse. On the whole, there has been a gradual development of the means of transport; but the rate of development has been very unequal in different regions and at different times, and in our own age it has attained the highest pitch yet reached. As this development has proceeded, the variety of products entering into commerce and obtainable at particular places has constantly increased. In the earliest periods the articles in which commerce was carried on on a great scale, involving the longest and costliest journeys, were necessarily such as were of great value in proportion to their bulk. Such commerce supplied chiefly the luxuries of the rich, and commodities on which a high value was conferred by religion. Records of early Egyptian, Assyrian, and Phœnician trade speak of gold, silver, and precious stones, ebony and fine woods, ivory and inlaid work, incense and perfumes, balsams and gums, apes, peacocks, panther-skins, and slaves as the principal gifts of commerce. Indian dyes (indigo) appear to have reached Egypt in the time of the eighteenth dynasty (1700–1475 B.C.); Baltic amber was probably brought to Assyria in the time of Tiglath-Pileser II. (eighth century B.C.); and Chinese silks are known to have reached the Indus through Afghanistan in the fourth century B.C., though probably without anything being known in the country where the goods were bought of the country in which they originated. The silks were no doubt gradually transferred from tribe to tribe on the route, and in this manner they are likely to have occasionally reached the West at a much earlier date.

The trade in bulky articles such as grain brought from a distance was necessarily confined to regions easily brought into communication with one another by good water carriage. From an early period in Greek history the necessity for this trade gave peculiar importance to the grain-growing regions on the northern shores of the Black Sea. Rome at the height of its prosperity first made Sicily a granary for central Italy during the later period of the Republic, and under the Empire grain was likewise obtained from Egypt and Cilicia, Mauretania, and Spain. Sea carriage within the Mediterranean rendered all these sources of supply easy of access; but where distant land carriage was added, especially for the material of an artistic product, the prices demanded were such as only the wealthiest could pay. Varro, in the first century B.C., mentions citron-wood along with gold as among the costliest luxuries at Rome, and about the same date as much as 1,400,000 sesterces (£10,500) was paid for Alexandrian tables made of thya-wood (the wood of *Callitris quadrivalvis*) with ivory feet.

Coming down to the most flourishing period of the trade of Italy with the East, that is, towards the close of the fifteenth century, just before the discovery of the sea-way thither, we find that the principal articles of commerce were silk, silk-stuffs and other costly

manufactures, spices, and drugs. At Antwerp in 1560, after the sea-way to the East had been fully established, and that city had attained the summit of its maritime and commercial prosperity, though the commodities that were dealt in include leather, flax, tallow, salt fish, timber, corn and pulse, and other articles of general consumption, there is a remarkable prominence of costlier articles, such as wrought silks and velvets, cloth of gold and silver, tapestries, dimities of fine sorts, jewels and pearls, dyes and perfumes, drugs and spices.

In Shakespeare's time we know from Shakespeare himself that sugar, currants, and dates, rice, mace, nutmegs, and ginger, as well as civet and 'medicinable gum,' were all familiar in England, while the manufactured products of the time comprised, among others,

> Fine linen, Turkey cushions boss'd with pearl,
> Valance of Venice gold in needle-work.

Tobacco, though not mentioned by Shakespeare, was already in use in England. Of the articles mentioned, however, some that are now within the reach of every one must have been, at the period referred to, comparatively rare luxuries. Without going beyond Shakespeare we get a hint that rice was dear. 'What will this sister of mine do with rice? But my father hath made her mistress of the feast, and she lays it on.' From other sources we learn the cost of some of the other tropical products mentioned. In 1589 a quarter of an ounce of tobacco cost in England 10*d.*, 1 lb. of sugar 20*d.*; and the difference in money value between then and now gives an inadequate idea of the actual difference in cost, for we find from the same source that a pound of sugar then cost (at least in the country) as much as a quarter (28 lbs.) of veal or mutton.

The contrast between Shakespeare's day and our own is striking in many ways. Tea, coffee, and cocoa, besides other minor but still familiar articles, such as sago and tapioca, have all been added, along with a host of others, to the list of mercantile commodities. The price of tropical products has been so reduced that, for example, tea, sugar, coffee, cocoa, and tobacco have all become necessaries of life even in the Arctic home of the Laplanders. In the trade of the world almost universally the articles of greatest aggregate value have come to be the natural products, raw materials, and manufactured articles in most general use—wheat and rice, meat, bacon, and hams, butter and cheese, cotton and cottons, wool and woollens, iron and ironwares, besides rubber and rubber goods, &c. Even in the export trade of India spices have disappeared from the list of the first nine articles, and, as may be seen from the tables of the commerce of that country, the principal commodities exported are mostly bulky raw or semi-manufactured commodities. One drug only, opium, continued till the twentieth

century to take a leading place among the exports, and this would have been of comparatively small importance had it not been for one great market (China).

We thus see that the increasing variety of commodities entering into commerce is in a great measure an increase in the commoner articles of consumption. To get an idea of the extent of the variety that has been attained through the gigantic and complicated commerce of the present day, there is no better method than to examine the price-list of one of the great department stores or miscellaneous retail shops now so common.

The equalising tendency of commerce has already been incidentally illustrated by the reduction of price of tropical commodities just referred to ; but this tendency needs a little further elucidation.

The tendency may be described, first, as one towards equality of prices from year to year—in other words, to stability of prices ; a tendency manifested most conspicuously in the case of those commodities the supply of which in any particular region, apart from commerce, is largely dependent on the weather. Between 1641 and 1741 the price of wheat per quarter (8 bushels) in England oscillated between 23*s*. and 76*s*. ; in the period from 1741 to 1841, between 22*s*. and 129*s*., the highest prices being reached during the period of the Napoleonic wars ; in the period 1842 to 1883 the limits of oscillation were only 39*s*. and 75*s*., the latter figure being reached only during the Crimean war. The early years of the present century again saw very low prices with the abundance of supply from the new lands.

But the tendency of which we are now speaking is, secondly, a tendency towards equality of prices in different regions of production ; a tendency in perfect keeping with that just spoken of, being in fact due to the same cause. Excessive prices in one region are kept down by supplies sent from other regions where the commodity is cheap, and the sending away of the surplus from these latter regions tends to raise the price in them. The effect of this nature attributable to commerce is best recognised by observing the conditions that prevail in places where communications are very imperfect and commerce consequently limited. Thus, in 1885, when Quito, a town in the Andes at the height of nearly 10,000 feet above sea-level, could be reached from Guayaquil, the principal port on the coast, only by means of pack-animals, which had to travel a distance of 320 miles, local produce was exceptionally cheap, but imported articles were excessively dear. Beef sold at from 2*d*. to 2½*d*. a pound, mutton 1½*d*. to 2*d*., chickens 6*d*. to 7½*d*. apiece ; ordinary labourers received about 6*d*. ; carpenters, stonemasons, and other artisans about 1*s*. a day, finding their own food. On the other hand, dry goods, hardware, common cutlery, crockery, and imported furniture were from 25 to 50 per cent. higher than in

foreign markets ; and common ironware cost fully twice as much as in the countries from which it was brought. So also in the hills of the Upper Chindwin district in Burma, a thousand miles from Rangoon, the writer found as recently as 1925 that three chickens could be bought for 1*s.* 4*d.*, but the same sum was freely offered by the local inhabitants for an empty wine bottle.

Now it has to be noted that while the tendency of commerce is towards comparative steadiness in prices, yet the level towards which the price tends is not the lowest level in any place of production. Merchants sell abroad because they can thus get a better price than at home. It is their quest after higher prices that reduces the inequality under this head in different parts of the world. To them the advantage of an extended commerce is this, that the wider the commerce the greater is their choice of customers.

Hence there follows a third great result of the growth of commerce, namely, the development of the resources of different regions to the utmost extent possible under the existing conditions, whatever these may be, and with this development the keenest and most widespread competition, which is, indeed, only another aspect of the same great fact.

But in process of this development it becomes apparent that the equalising tendency of commerce on which we have insisted is only a general tendency, which is apt to be masked now and again by disturbances, by great variations in price, due directly or indirectly to the operations of commerce itself.

These disturbances may arise from inventions causing a sudden cheapening in the processes of production, such as the great textile inventions or those which gave rise to the modern methods of steel-making ; they may arise from the introduction of cheaper means of transport, and the disturbance due to this cause is felt all the more keenly when the cheaper transport is to regions in which there is exceptionally cheap labour or cheap land, and still more when it leads to the rapid settlement of land of unused and extraordinary fertility ; or they may arise from a vast and rapid expansion of the demand for some commodity—an expansion such as is only possible since commerce has come to be pursued on the extensive scale characteristic of the present time.

Such disturbances are sure to inflict hardship somewhere. The transition from domestic industry in spinning and weaving to the factory system is too far in the past in our own country for the attendant hardships of that transition to be remembered, or even generally known ; but these hardships are still being felt in some parts of the world, as in India, Indo-China, and China. In India we have, first of all, seen hand-spinners and weavers considerably impoverished by the commerce in English machine-made cottons, and subsequently a vigorous competition with our own cottons in the East

arise from the development of a mechanical textile industry based on local advantages. The effects of other causes of disturbance have been well illustrated in recent years—in the World War and the subsequent upheavals accompanied by the substitution of innumerable tariff barriers for free trade. The effect of the last of the causes of disturbance referred to at the end of the last paragraph is seen in the history of the iron trade after 1870. The average price of pig-iron warrants at Glasgow in the years 1869 to 1871 varied between about 53*s*. and 59*s*. per ton ; in 1872 the average rose to about 102*s*., in 1873 to 117*s*., after which it fell steadily to about 54*s*. in 1877. The sudden rise was due to the fact that, vast as our own commerce and industry had already become in 1872, it was not yet equal to the demands that were then made on it for the further expansion of commerce by the laying of numerous railways, and the establishment of numerous factories in America and Germany. The annual increase of railway mileage in America rose steadily from 1,177 miles in 1865 to 7,379 miles in 1871. The annual exports of iron and steel from the United Kingdom to the United States increased steadily from 186,000 tons in 1865 to 1,064,000 tons in 1871 ; those to Germany, Holland, and Belgium increased year by year from 255,000 tons in 1866 to 1,015,000 tons in 1872. But in the subsequent course of iron prices the general equalising tendency of commerce can still be detected. The vast demand of 1871 to 1873 led almost immediately to such an increase in the means of producing iron, that when the next great expansion of the demand came about it was met with greater ease and with less oscillation of prices. From 1877 to 1887 the extreme variations in average annual price of pig-iron warrants at Glasgow were only about 40*s*. and 54*s*. 6*d*.

Inevitable as the hardships attendant on such disturbances are, the improvements that bring about such incidental results are of value to the world in the long run, in so far as they afford the means of permanently lightening human labour in the production and distribution of the means of satisfying human wants. That they do so for an ever-increasing proportion of the inhabitants of the world would appear to follow from the fact to which attention has already been drawn, the increasing proportion of the necessaries of life and the articles of most general consumption entering into the aggregate commerce of the world. The large and quick steamers, the numberless railway trains, in short all the vast apparatus that now stands at the service of commerce, can be kept working only by transporting commodities consumed in the largest quantity, such therefore as satisfy the wants of the multitude. In the years since the War invention has succeeded invention with such rapidity that changes have been almost continuous, and the nations are facing such problems as permanent unemployment. Sir Josiah Stamp,

in his Presidential Address to the British Association in Blackpool in 1936, dealt with this question of the impact of science on society.

If there is any permanent benefit to mankind at large from the developments of which we are now speaking, it is worthy of note that the full advantage of this nature is not reaped until every kind of production is carried on in the place that has the greatest natural advantages for the supply of a particular market. By natural advantages are meant such as these—a favourable soil and climate, the existence of facilities for communication external and internal so far as these lie in the nature of the surface and physical features, the existence of valuable minerals in favourable situations, and especially of the materials for making and driving machinery, these being among the products which are least able to bear the cost of carriage. All these advantages are more or less permanent, or at least such as are exhaustible are for the most part liable to exhaustion only by slow degrees. Unfortunately, the nations of the world are showing signs of ignoring this simple truth and are seeking to build up industries behind tariff walls which are not suited to the localities concerned and for which there are no natural advantages.

With natural advantages may be contrasted historical advantages, which are in their nature more temporary, though they are often in fact of long continuance. Perhaps the most important of all is a strong and stable government based on just and fixed principles not hostile to industry ; and this, it may be observed, is one of those which may be very enduring in fact, as the disadvantage arising from the want of that condition is very apt to be.

Inasmuch as some advantages for commerce and industry are thus temporary in their nature, it is necessarily more or less perilous for a country to have its commercial and industrial prosperity based chiefly on advantages of this kind ; and there are numberless examples in history to show the hardship and disaster that may result from the withdrawal of the advantages on which a temporary superiority was based. We may refer in illustration of this to the losses that fell upon Italian commerce after the discovery of the sea-way to the East, the prosperity of that commerce being based in a large measure on the central position of Italy—a position which was permanent only so long as the geography of the world was imperfectly known. It is specially disadvantageous for any country when the temporary prosperity of any of its chief industries is based on a circumstance that must in itself be regarded as disadvantageous —such, for example, as low wages.

With reference to the temporary character of certain advantages for commerce and industry, it is likewise a fact of the greatest moment that, viewed broadly, the commerce and industry of the world have for more than a hundred years been in a transition stage the like of which has never been known before. Communications

are being improved, the means of production are being accelerated and cheapened, uncultivated lands are being settled, and primitive peoples introduced to the inventions of the white races with a rapidity hitherto unparalleled—with incidental results, as we have seen, not always the most desirable. Commerce and industry thus tend to be governed more and more by geographical conditions, which accordingly demand the most careful and detailed examination, an examination much more thorough than can be attempted within the limits of this work.

The statement just made is often denied, and that in such a manner as to suggest not merely that the opposite is the truth, but too obviously the truth for that to be called in question. The difference of opinion results from a difference in the point of view, but the point of view of those who contend that geographical conditions are counting for less and less instead of more and more seems to me the one less conducive to clearness. Those who hold this view will point out that now where an isthmus stands in man's way he cuts it; a mountain, he bores it. True, but those who think only of this fail to notice that in the case of those epoch-making achievements wide-reaching geographical relations determine what isthmuses to cut, what mountains to pierce, and a close study of the local conditions is made to decide where and how the works had best be carried out. Railways, we are told, make man no longer dependent only on inland waterways for the carriage of bulky produce long distances. True, but in the laying of railways through hilly or mountainous country more care than ever is being taken to avoid stiff gradients and sharp curves, and similar care is now taken in the alignment of great motor roads. The steepness of the gradient on the west side of the Kicking Horse Pass across the Rocky Mountains ultimately compelled the Canadian Pacific Railway to provide an easier descent at the cost of a somewhat lengthened route. In the north-west of Switzerland an even more striking change was made under the imperious demands of modern competition. A tunnel already existing at a high level through the Hauenstein has been superseded by another nearly at base level. In some cases the influence of the superficial configuration of a region or the traffic it supplies on the means of transport is seen in another way, as the determining cause of electric in place of steam haulage.

The opening up of the entire world by improved means of communication is leading capitalists to search out every part where development is possible and to remove obstacles to development wherever that can be done, but the very fact that man is acquiring greater power in dealing with nature makes clearer the limit beyond which he cannot pass in his modifications of the original conditions. Nowhere is this clearer than in the creation of oases, where lie side

by side 'the desert and the sown.' Irrigation in recent years has been greatly extended in many parts of the world, but geographical conditions determine just where it is possible. A glance at the irrigation map of the western United States (p. 737) is enough to show how small a proportion of a vast arid region is capable of being thus reclaimed. The tendency of which we are now speaking towards an ultimate prevalence of geographical conditions in determining the distribution of commerce and industry is, it is true, a tendency to a remote result. The influences tending to localise industries in particular regions are indeed very varied and complex in their action, especially in modern times. On this subject the reader is referred to what is said under Commercial and Industrial Towns on pp. 103–112, and here it is enough to add that the chief means of thwarting the dominant tendency of geographical conditions in commerce and industry is not man's increasing control over nature, but his political action, which, either by tariffs or by other means, may direct commerce more or less into certain channels.

The advantages that may be expected to be reaped when the development of commerce has reached its goal are the enjoyment of the greatest possible variety of commodities at all the habitable parts of the earth (that is, the greatest variety possible for each place), and the utmost attainable stability of prices. When the network of commerce is complete in its main lines, when it has only to be gradually and regularly extended or made more intricate with the development of population, the deficiencies in the natural products of one region will be supplied with the least possible delay and at the least possible cost from any surplus that may accrue in other regions. It is true that this will take place only on condition that the region so supplied has something to give in exchange for that which is supplied; but with reference to this proviso, it is an important consideration that the stability of prices towards which a fully developed commerce tends is in itself in the highest degree favourable to that foresight which is the necessary condition of ensuring that stability. It facilitates a just estimate of the future. Rendering foresight easier it makes prudent conduct more certain of reward, and may be expected, therefore, to render its practice more general among the community.

Meantime, however, it cannot be forgotten that, however fast commerce may seem to be hastening towards its goal, it is still very far from having reached that goal. What we now see, accordingly, is the greatest haste on all sides to secure such advantages as may offer themselves for the prosecution of commerce and industry; we see an extreme phase of competitive and aggressive commerce as between nation and nation, individual and individual.

It is only with nations that we have here to do, and we may now note the principal means by which nations, whether through

their governments or through other institutions, endeavour to promote their own commerce and industry.

As the first of these means may be mentioned protective tariffs; that is, duties levied upon imports upon such a scale as to encourage the production of the goods so taxed in the country itself by the total or partial exclusion of such goods of foreign origin. It is obvious that by this method only certain branches of internal commerce of a country are fostered, and the external commerce of the country is hampered. But it may be pointed out that in so far as such duties may be necessary or may help to establish an industry in a region in which it is fitted by natural advantages to take root and flourish independently of such fostering, the imposition of duties of this nature tends in the direction of the goal towards which commerce as a whole is moving. The direct and immediate effect of high tariffs is, however, opposed to the tendency of the changes in progress referred to on p. 7, and especially of the rapid multiplication of means of communication. When efforts of one kind are being constantly made to cheapen the supply of commodities it is scarcely credible that those who consume the commodities will always consent to have their price raised by an arbitrary barrier.

This last remark is made, however, solely from the point of view of commerce, and does not exclude the consideration that there may be other reasons for the imposition of tariffs in the interest of the state. The term key industries has been applied to such as it is considered essential for the good of the state to defend at any cost. In our own country agriculture and certain chemical industries, in particular the manufacture of those commodities which are required for the manufacture both of coal-tar dyes and of high explosives, are among those which since the War have come to be very generally considered as belonging to this class.

Export duties are not so frequently levied as import duties, although they are becoming more common. Obviously, they can be levied only on those commodities in producing which the state levying the duties has by nature an advantage so great as almost to amount to a monopoly such as was enjoyed during the Middle Ages by England in certain kinds of raw wool, the export duties on which made up for centuries the great bulk of the revenue of the state.

Bounties—that is, payments made directly or indirectly on the exportation of goods—are another means sometimes resorted to by governments with the view of encouraging industries; and with reference to these also it may be said that if it can be proved that a bounty has ever served to establish an industry capable afterwards of being maintained on a self-supporting footing, then a similar plea may be entered in favour of this aid to industry. One of the com-

monest forms of bounty now in use is the paying of a subsidy to certain lines of shipping (generally, however, in return for services in the carriage of mails or otherwise). The sugar industry is the most important of those which have been affected by subsidies in recent years. Allied to bounties are rebates on taxes or costs to which the industry would normally be subject. Great changes in the extent of government interference with trade by way of protective duties or bounties are, apart from war, perhaps the most deplorable, because the most arbitrary, of the disturbances of the commercial relations subsisting at any period.

We have all experience now of the effects of war on industry and commerce, though we are even yet unable to gauge their full extent. They include immense destruction of life, which means labour power, and that at the period of greatest vigour ; the impairment of the health of multitudes not directly engaged in the war ; a great check to the birth-rate in the belligerent countries ; destruction of property of all kinds ; diversion to various destructive agencies of the labour normally devoted to providing for the future, especially by the creation of transport facilities, the erection of plant, and the manufacture of machinery ; the sudden redistribution of capital, where that redistribution takes place within the state, the burdening for years to come of the bulk of the population with payments due to the smaller section of the people who form the state creditors, and, where that redistribution operates between state and state, changes in the relative advantages for production and commerce which may prove permanent. There is the loss of markets to a belligerent nation, a loss which may never be recovered as others step in as suppliers and a permanent rearrangement of the channels of commerce results. It is not out of place here to refer also to the mutual hatred and distrust between nations resulting from war, inasmuch as industry and commerce nowadays depend so largely on credit, which implies mutual confidence. Politicians, capitalists, captains of industry, and the workers are alike bewildered as to the situation, and twenty years after the Great War we do not know the new level from which rebuilding may start in conditions that give some promise of security for the future.

Governments assist commerce by maintaining officers known as consuls in the principal mercantile towns of foreign countries ; the officers so named being charged with the duty, not merely of looking after the interests of subjects of the country represented by them in the sphere of their consular districts, but likewise with that of furnishing such information as is likely to be of use to the merchants of that country. In many cases commercial attachés are concerned solely with this task. Typical of the reports are the fine series issued by the Department of Overseas Trade. The name consul is of Latin origin, and the present application of the title

originated, with the practice of maintaining such officials, among the trading communities of Italy in the twelfth century. In the Austrian Empire there was an academy under the control of the Minister of Foreign Affairs for the education of candidates for the diplomatic and consular services. Being primarily intended for those preparing for service in the East, it was known as the Oriental Academy; and the course of instruction embraced a legal training, military geography, and tactical science, as well as the teaching of 'Turkish, Arabic, Persian, Hungarian, French, Italian, English, Russian, Modern Greek, and Servian.'

British merchants and manufacturers have not the advantage of being able to consult British consular reports with reference to the extensive areas embraced by the British empire, but this want is met more or less in other ways. First, the self-governing portions of the empire maintain representatives under various titles, who make it part of their business to disseminate information likely to promote trade between the mother country and the dominions which they represent. Then, in the case of the other parts of the empire, the Colonial Office issues from time to time reports similar in their content to those received from consuls in foreign countries. Thirdly, in recent years the home government has appointed trade commissioners to various parts of the world, including those belonging to the empire.

The establishment of chambers of commerce, or voluntary associations of merchants in different localities, is now almost universal, and similar chambers are now being established by merchants of different countries in foreign cities where a large amount of business is conducted. It is in keeping with modern tendencies that an Association of British Chambers of Commerce and an International Chamber of Commerce have been formed.

Another method of promoting national commerce now coming into more and more general use all the world over is the establishment of commercial libraries and museums, and those large fairs or exhibitions which have become increasingly popular in recent years. Exhibitions are a kind of temporary commercial museum, and floating exhibitions intended to convey samples of a country's commodities to various stations in distant markets are one of the latest means resorted to in different countries with the view of promoting national commerce.

In the United Kingdom the Imperial Institute, founded in 1886 and placed on January 1, 1903, under the management of the Board of Trade, includes, among other things, a commercial museum of the products of the British Empire and is especially concerned in spreading knowledge amongst the rank and file of citizens, especially young people. Most of the colonial governments in their London offices have permanent exhibitions of the commercial products of

their respective countries ; whilst it has been proved that great exhibitions such as that held at Wembley in 1924–25 have been of more vital interest than museums.

Commercial and technical education are other means of promoting national commerce of great importance. This is recognised by the existence of many professional institutes (such as the Institute of Bankers) conducting examinations and whose aims are mainly educational and nearly all of which include commercial geography in their requirements.

An inevitable feature of war, especially war on a gigantic scale like that of 1914–18, is the extension of government control of industry, and even the direct participation of the government in industry. On the one hand, it has to be kept in mind that such success as was achieved by the government in industry during the War was secured at the expense of the taxpayer, whereas industry must be able normally not merely to maintain itself by its own produce, but also to provide for its own growth. On the other hand, one cannot forget that for a long time the tendency in many parts of the world, and above all perhaps in some of the self-governing dominions of the British Empire, has been towards a great extension of the share taken by the state in industries of various kinds. In most of the dominions and colonies the railways belong to the state ; and indeed the private ownership of railways, as in the United Kingdom, the United States, and the Argentine Republic, is now rather exceptional. The Canadian government is an owner also of elevators and steamships, and ships for trading purposes are owned by other governments. The Queensland government formerly carried on the business of timber-milling, trawling, insurance, cattle-rearing, and even kept retail butcher shops. The constitution of the German republic gives to the state not only the railways, but also the lignite and electrical industries, whilst under the Soviet system in Russia ownership and control is all-embracing. Our own government still hangs back for the most part from direct participation in trade and industry. Still, it has been a large proprietor of shares in the Suez Canal since 1875, and during the War it became a partner in the Anglo-Iranian (formerly Anglo-Persian) Oil Co., and gave financial support to companies engaged in the manufacture of dyestuffs. This policy has been continued by the numerous marketing boards, quotas, and subsidies.

Several of these means of retaining and promoting commerce remind us forcibly of the closeness of the bonds with which commerce is steadily drawing different countries together, and of the complicated action and reaction between different parts of the world to which commerce gives rise. The improvement of machinery, of processes of production, of means of communication, the better organisation of industry, the advancement of education in one

country, demand similar advances in other countries. New wheat-fields in America necessitate improved systems of agriculture and the advancement of agricultural education in England, the introduction of better agricultural machinery into Russia. The perfecting of the processes in the refining of beet-sugar in Germany demands better organisation among the cane-planters of the West Indies and Guiana. The working classes more and more clearly recognise that any advantage secured for themselves in one country must be extended also to other countries. As long ago as 1885 the United States consul for Dundee stated that the longer hours worked in the Calcutta jute-mills were believed to be the determining cause of the depression in the jute industry of Dundee, arising from the competition of Bengal; and he added that both employers and employed were consequently anxious that the ten-hours-a-day Factory Act should be extended to India. On the continent of Europe a long agitation in favour of international legislation on this subject led, at least in part, to the establishment of the International Labour Office in Geneva. The present power of Japan to compete in world markets on too advantageous terms would be obviated by a higher standard of living and hence higher labour costs in the country itself.

It may perhaps be looked upon as one of the hopeful features for the future that the importance of the considerations set forth in the preceding paragraph is coming to be more and more clearly recognised, and that the more enlightened among both masters and men are becoming increasingly convinced that it is only by mutual and world-wide co-operation that some of the most perplexing problems of industry can find a solution. 'After all,' said the Rt. Hon. G. N. Barnes in a speech on the Treaty of Peace Bill in the House of Commons on July 21, 1919, 'hard conditions of life are not due to any conscious cruelty on the part of any class or any individual. They are rather due to fundamental causes which can be removed only by the co-operation of classes.' Instances of the readiness on the side of capitalists to co-operate in this way, especially in the way of providing good housing and garden accommodation, are already too numerous to particularise. If one result of the Great War should be that all countries came to realise that the healthiest conditions in the widest sense of the term for all engaged in industry were essential to the highest prosperity of industry, and all governments accordingly made it a prime aim to do what in them lay to secure such conditions as a permanency, we should all then be able to acclaim at least one good as issuing from that calamity. The establishment of the Ministry of Health in Britain may be noted in this connection.

ECONOMIC STATISTICS

One of the chief uses, if not absolutely the most important of all the uses of the study of Commercial or Economic Geography, is to enable us to form some reasonable estimate of the future course of commercial development, so far as that is governed by geographical conditions. Such an estimate must, of course, be based on one's knowledge of forces that can be seen in operation at the present time, and must be recognised as liable to be falsified by discoveries which it is impossible to foresee. The keenest and most widely informed have made forecasts which have proved to be utterly wide of the truth, but which could not be called unreasonable at the time. When Adam Smith wrote that 'the small quantity of foreign corn imported, even in times of the greatest scarcity, may satisfy our farmers that they can have nothing to fear from the freest importation' ('Wealth of Nations,' Book IV. Chap. II.), it was not expected that any one should be able to foresee the ultimate consequences of the inventions of the ingenious young instrument-maker whom Smith had befriended at Glasgow. When Dr. P. Colquhoun in his 'Wealth of the British Empire' (2nd edition, 1815) demonstrated the utter inutility of the new British colony in Australia, even that can hardly be pronounced unreasonable in the light of the knowledge of the time. Such forecasts may serve to remind us of the tacit qualifications with which all attempts to anticipate the future are to be interpreted, but do not show the inutility of making such anticipations as the circumstances allow.

In attempting such forecasts statistical data are unquestionably an important aid. In Commercial Geography the value of figures is twofold. First, they help at any particular time to distinguish the important from the unimportant. Second, when we have figures for a series of years they direct attention to changes that have been in progress in the past, and may thus serve to suggest the most fruitful branches of inquiry with reference to any geographical causes that may have contributed to such changes, and help us to estimate with more chance of success their probable action in the future. In both ways they serve as a guide to what is most worthy of examination in our special subject. In order that they may illustrate changes in progress it is obvious that the series are likely to be the more instructive the longer and the more

continuous they are, and the more numerous those series are which are directly comparable one with the other. It has been considered an advantage to retain in this work the comparative trade tables beginning with 1871–75 and ending with 1924, adding thereto a new series of tables showing the development of post-War trade.

Figures stating values may be very misleading in making comparisons between different periods even in the trade of the same country. With a view to removing this misleading tendency various index-numbers, as they are called, have been calculated, and the tables on p. 357, extracted from the *Statist*, give some of the index-numbers for British trade. The tables, however, require some explanation. For the individual commodities the index-number merely expresses the ratio of the average value of a given quantity of each commodity in a given year to the value which it would have had at the average price of the year or period (in this case 1867–77) which is taken as the base. Such index-numbers are not, however, index-numbers in the proper sense of the term, that is, numbers calculated to serve as an index of other numbers not definitely known. This is what is aimed at by the general index-number, which is based on the average price of forty-five commodities, all articles largely consumed, such as wheat or wine or raw materials, but including such raw materials as bricks and hewn fir. In working out the general index-number these forty-five commodities are regarded as of equal importance but in other calculations the commodities selected are not allowed to count equally, but are weighted or multiplied by different numbers in different cases.

If then those forty-five commodities may be taken as illustrative, the general index-number will thus serve to show how far values have been affected by some cause or causes having a wide-reaching influence, and the variations in the index-numbers for the individual commodities when compared with the general index-numbers will be the means of indicating how far some special cause or causes must have affected their fluctuations in value. It should be noted that the basal period 1867–77 was arbitrarily chosen, just as the old Board of Trade index used 1900. In 1921 the Board of Trade adopted an index number on a new principle.

Whatever be the cause of changes in index-numbers, the facts underlying those changes modify, and sometimes to an important degree, the significance of the values given for exports and imports. For example, if we take the average value of imports into the United Kingdom for each of the periods of five years from 1871–75 to 1906–10, we find that there is only one, namely, the period 1886–90, which shows a decline in value as compared with the previous quinquennium—in round numbers £390 against £400 millions. But if we apply the Board of Trade index-number, base 1900, to these figures the values become changed to £333 millions in 1881–5

and £379 millions in 1886–90, showing an increase in the latter period of nearly 14 per cent. instead of a decrease of about 2½ per cent. Now with an index-number calculated as was the old Board of Trade figure by allotting a weight to each commodity proportional to the average value of annual consumption, this shows that during the latter period considerably more supplies of food and raw materials must have been coming into the country than in the one before. That being so, we may be sure that those increased supplies would find their way into the hands of consumers. Stocks are not kept on indefinitely in the hope of better prices. Perishable goods cannot be. So far as the increased imports, then, were food-stuffs, they must have been a direct benefit to the consumers ; so far as they were raw materials, increased supplies must have helped to maintain the demand for labour, for they were imported in order to be used, and manufacturers still found their advantage in using them in spite of the fact that they did not see their way to sell the products at former prices. It is not even a necessary consequence that the lower selling prices of the products meant lower profits to the manufacturers.

Further, when the tables of imports and exports are used for making comparisons of the trade of different countries one may be led into error in various ways. First, it is important to remember that such returns for the same country do not always refer to the same economic unit. When accessions of territory are gained by any country there is likely to be a change of this nature : similarly when territory is lost. Next, it is to be noted that there is no uniformity in the nature of the total given for the trade of a country, whether the commerce referred to be designated general or special. Under the name of general commerce all articles imported and exported are included, but under the head of special commerce only goods imported for home consumption and goods of home production exported are supposed to be reckoned. But this is far from being uniformly true. Very generally goods that enter into circulation in the country free from the control of the customs are taken as part of the special commerce of the country. Thus, in the tables of German trade for 1911 raw cotton, caoutchouc, and rice appear among the special exports to the aggregate value of more than £6,000,000, although obviously none of these is a product of Germany, and we cannot tell how great may have been the value of other re-exports when the goods are of such a nature that they may or may not have been German products. In our own country, on the other hand, no attempt has been made to distinguish goods imported for home consumption, but a distinction is always made between exports of native origin and manufacture, whether free goods or goods subject to customs duty, and goods of foreign and colonial origin. Note, however, that goods that have undergone

the slightest manufacturing operation, such as colonial wool combed in Great Britain, are included (rightly) among the goods of British manufacture. In two points, however, our tables are misleading or inadequate from causes which perhaps cannot be remedied. The general tables are exclusive of what is called transhipment trade, of which a separate statement is made. The transhipment trade is exclusively of articles imported and exported in bond, and may include, actually does include, a considerable amount of trade on British account, that is, the import of goods bought by British merchants and resold by them abroad.

Statistics of external commerce usually include statements as to the description of the goods exported or imported, the quantities, the countries of origin or destination of the goods, and the value. In the case of many articles, and especially those most largely imported and exported, such as food-stuffs and raw materials, the description of the article presents no difficulty, so that one may deal with returns as to such commodities in making comparisons between. period and period in the trade of the same country, or between different countries for the same or different periods without fear of being misled. But in many cases it is otherwise, and difficulties in making comparisons for the same country for long periods are constantly being made by tariff changes necessitating different classifications, and even where there are no tariff changes alterations in the classification of goods are often made simply with the view of giving a more satisfactory statement of the facts of commerce. However useful such changes may be from one point of view, it has always to be remembered that they have the drawback referred to. This drawback arises, it should be added, even when increased care is used, and hence increased accuracy arrived at in the collection of the original data. It is largely because of the impossibility of comparing post-War statements with pre-War that a new series of tables has been added for each country.

Notes are also given on the individual tables as to the various practices in stating the countries of origin and destination. In some cases the practice with regard to values has been, in one case until recently, even more misleading than any of the practices that have prevailed with respect to the point just mentioned. In England the earliest attempts at the systematic collection of commercial statistics appear to have been made in 1697. From that time down to 1797, inclusive, the values entered for English commerce and, after the union of the Parliaments in 1707, for that of Great Britain, were official values based on the prices of 1694 and for new articles on the price of the first year of their introduction. The so-called values were, accordingly, not true values, but for each commodity served to give indications of changes in quantity from year to year, while the totals had little meaning at all. From 1798 in the case of

exports declared values were added, not substituted, so that we have the absurdity in Porter's 'Progress of the Nation'[1] of two tables giving professedly the same thing, the value to the last pound of exports from the United Kingdom from 1801 to 1849, yet utterly divergent from one another, showing from 1820 onwards a steadily growing excess of official over declared values till in 1849 we have

Official Value	£164,539,504
Declared Value	63,596,025.

In the commercial statistics of the Netherlands the use of official values was maintained until the end of 1916. The 'values' in Dutch returns were based on the prices of 1860 or thereabouts. In one case, Peruvian bark, the so-called value was, in a year just before the War, more than seventy times what may be taken to be near the true value.

In the case of imports computed values, that is, values officially estimated in accordance with what were believed to be the current prices of the time, were introduced and used in Britain till 1870 inclusive, but from 1871 onwards declared values have been entered for imports also. This should warn us to use a great deal of caution in carrying our comparisons of import values farther back than 1870. It is for this reason that none of the tables in this book go back to a period prior to 1871. It should be added that according to British practice import values are those at the port of arrival, that is, include freight but not merchant's profit, export values those at the port of shipment, 'free on board' (f.o.b.). Notes are given on the different tables as to the mode of valuation adopted by different countries. The problem of comparing the trade of the countries of the world has now become much simpler through the comprehensive publications of the League of Nations.

No student of commercial geography can be unaware how many subjects there are that still await investigation, and in many cases how far the means for obtaining the desired information are lacking. This deficiency is felt in a peculiar degree with regard to the trade, and more particularly the home or internal trade, of our own country, but in all countries one has often to regret that the available data refer to the country as a whole instead of particular regions which it would be desirable to investigate. Sir Josiah Stamp in his important Presidential Address to the Geographical Association in 1937 dealt with the contacts between geography and economic theory. He pleaded for an understanding of economics by geographers and for a greater use of geographical facts and illustrations by economists. He pointed out that five types of geographic-economic studies could be distinguished : (*a*) the simple static, when a present-day geographic fact was explained by an

[1] Edition 1851, p. 356.

economic fact—really no explanation at all ; (*b*) the inductive static, when several such examples were used to formulate a general statement ; (*c*) the simple dynamic, when the element of change and the historical factor were introduced ; (*d*) the inductive dynamic, and finally (*e*) the formulation of general economic or geographical laws based on a wide study of examples of the fourth class. He held that economic geographers had not yet reached the fifth stage and that an immense field of work remained to be explored.

Some of the suggestions for further investigations which Chisholm listed in earlier editions of this work might well be revived in the light of such a general programme.

How far British rule in different parts of the world has contributed to the growth of the trade of foreign countries.

The conditions of commercially successful and unsuccessful irrigation.

The advantages of rural and urban centres for different kinds of manufacturing industry.

The effect on commerce of the construction of particular railways.

The relations of seaports to their hinterlands.

The influence on commerce of the possession by different countries of bulky commodities such as coal, timber, salt, ice, cement, wool, grain, and the like.

The effect of local labour, local supplies of raw material, and local markets in the development of manufacturing industries.

The exhaustibility of natural advantages for any particular kind of production, as evidenced by a rapid followed by a slower expansion of a local industry concerned in such production.

The effects of government interference in modifying the influence of natural advantages.

The gradual conversion of manufacturing industry from the lower to the higher branches.

GENERAL FACTS RELATING TO THE PRODUCTION, DISTRIBUTION, AND EXCHANGE OF COMMODITIES

I. CLIMATE

Under the head of climate we have to consider here only the main climatic factors affecting the production and distribution of articles of commerce. The commodities whose production is most immediately affected by climatic conditions are those derived from the vegetable kingdom ; but those of animal origin, being directly or indirectly dependent on vegetation, are subject to the same influences. It is, however, climate as influencing vegetation, and more particularly as influencing cultivation, or the bestowal of human labour in promoting vegetation, that we have to keep chiefly in view in considering the effect of climate on the production of commodities.

For all kinds of vegetation there is required a certain amount of **heat** and a certain amount of **moisture**. The great source of heat is the sun, and of moisture the ocean, where evaporation is brought about through the heat of the sun. The winds, however, are the carriers of both heat and moisture, so that it is essential to study the direction of the prevailing winds in order to understand the distribution of temperature and rainfall over the globe. **Temperature** decreases on the whole from the vicinity of the equator towards the poles, but the rate of decrease is very unequal over land and water. Water being more slowly heated and cooled than the land, the diminution in temperature towards the poles is more rapid over the ocean than over the land in summer, less rapid in winter. The ocean and other large bodies of water for this reason have an equalising effect on the temperature of adjacent lands, but this effect is brought about mainly or solely by the agency of the winds. With reference to land temperatures accordingly it is more important to consider the direction of the prevailing winds than the mere distribution of land and water. Winds depend on local differences in the pressure of the atmosphere. They tend to blow from regions of high pressure to regions of low pressure. Regions of low pressure occur over the warmest parts of the ocean near the equator, and in the interior of the great land-masses in summer, when they are most directly exposed to the rays of the sun. Over the ocean

the region of high temperature and low pressure forms a belt, towards which winds blow more or less from the north and south. The direction of these winds is, however, modified by the rotation of the earth, in consequence of which these winds, known as the **trade-winds**, blow more or less from the east, over some parts of the ocean with such regularity that, in the language of Sir Thomas Browne, 'sailing from Lima to Manilla . . . you may fasten up the rudder and sleep before the wind.' It is important, therefore, to observe and constantly to bear in mind that over a great width of the ocean in low latitudes extending on both sides far beyond the tropics, there is a strong tendency for the winds to blow away from the west sides of the continents and towards the east sides of the continents. The position of this wide belt, or rather of the two wide belts separated by an intermediate belt of calms corresponding to that of lowest pressure, is not constant. It moves north and south with the sun, along with the whole system of atmospheric pressures dependent on the height of the sun above the horizon. Wherever and whenever the trade-winds blow, however, they have a certain effect in mitigating the temperatures of the regions exposed to them.

Outside of the trade-wind region there is normally in the winter months an area of low pressure in the North Atlantic to the north of 60° N., and in the North Pacific a similar area more to the south. Towards each of these the winds tend to blow, but in consequence of the rotation of the earth not directly, but in great spirals in which the direction of movement is opposite to that of the hands of a watch. Hence south-westerly, and consequently warm, winds prevail at this season on nearly all the west coasts of Europe and a large part of the west coast of America, while northerly, and hence cold, winds prevail on the opposite coasts, that is, on the east coast of North America, and the east coasts of northern Asia. The contrast between the temperature of these coasts in corresponding latitudes is another great fact constantly to be borne in mind, as well as the fact that the benefit of the relatively high winter temperatures is carried by the winds a greater or less distance inland. Warm ocean currents flowing in the same direction as these winds blow help to maintain their temperature, but it is to be observed that without the winds these currents would have little effect on the temperature over the land. In the summer months the area of low pressure still exists in the North Atlantic, so that in that period also south-westerly winds prevail, though not so strongly on the west European coasts. In the North Pacific during the summer months an area of low pressure can scarcely be said to exist. In the southern hemisphere outside of the trade-wind belt the conditions are greatly altered by the fact that the amount of land is very small. It is enough to say that there the prevailing winds throughout

the year, at least to the south of 40° S., are westerly. These westerlies blow more constantly over the open oceans of the southern hemisphere than elsewhere and are often referred to as the 'Roaring Forties.'

The influence of the pressure of the air over the land in determining the direction of the prevailing winds is most marked where there are great bodies of land to the north or south of seas in lower latitudes, above all in eastern Asia and in Australia. In the interior of eastern Asia in summer are regions of very low pressure, in winter of very high pressure. Hence, in summer ocean winds, south-westerly, southerly, south-easterly, blow over all the south-east of Asia, including the islands, from the Indian peninsula to about the parallel of 60° N. During the winter land-winds, north-easterly, northerly, north-westerly, prevail in the same region. These are the **monsoons**, which have an important effect on temperature as well as on rainfall. The word monsoon is derived from an Arabic word meaning a season, and is still used, in India, as meaning the rainy season. The summer winds, though blowing from lower latitudes, do not tend to raise the temperature, because they come from the ocean; but the winter winds being land-winds as well as coming from higher latitudes have a marked effect in lowering the temperatures, more particularly in the temperate zone. For this reason also the winter temperatures in the east of Asia are much lower than those in corresponding latitudes in the west of Europe and Africa, a fact of great importance in commercial geography. In Australia similar results are due to the alternation of high and low pressures in the interior, but owing to the difference of hemisphere the seasons and the directions of the winds are reversed.

In consequence of the facts stated with regard to the prevalent winds, there is, in the temperate zones, and more particularly in the northern hemisphere, a general lowering of the mean temperature from west to east over the land, due chiefly to an easterly increase in the cold of winter, and partly compensated by an easterly increase in the heat of summer. The increase in the extremes of heat and cold is greatest in the eastern or broader of the two great land-masses, and the lowest temperatures on the earth have been recorded towards the east of Asia, some distance inland, since the sea everywhere has some effect in mitigating extremes of temperature. While the eastern land-mass thus exhibits greater cold and greater contrasts of summer and winter temperature in the east of Asia than are presented in the east of America, its western or European portion, being exposed to warmer winds traversing a warmer ocean than those which visit the western coasts of North America in high latitudes, is characterised by a more equable climate and higher winter temperatures than corresponding latitudes on the latter coasts; and, in general, we find that when we compare equal latitudes in the west

of America and the west of Europe, the latter continent shows the higher temperatures ; but when we make a similar comparison for the east of America and the east of Asia, the higher temperatures are found in America.

By way of illustrating these great general facts by means of others having more bearing on the production and distribution of mercantile commodities, it may be mentioned that the northern limits of various cultivated plants whose range is somewhat rigorously determined by climate, such as the orange and the vine, are farther north in Europe than in the west of North America, but farther south in the east of Asia than in the east of North America ; that whereas the whole of the west coast of Norway, extending to beyond 70° N., is at all times free from ice, the northern coasts of the peninsula of Alaska, in about 57° or 58° N., are regularly beset by ice in winter ; but, on the other hand, whereas the eastern coasts of North America are rarely encumbered by ice south of the Gulf of St. Lawrence, in about 46° or 47° N., ice is to be seen in the Chinese Gulf of Pechili in lat. 40° ; and, again, Halifax, in Nova Scotia, in 44½° N., is nearly always open, and thus can serve as a winter-port for the Canadian Dominion ; while the Russian seaport of Vladivostock, in the east of Siberia, to the south of 43° N., is closed by ice for about a third part of the year. With regard to cultivated plants, however, it must be mentioned that those which are able to profit by long and hot summer days during a very short summer can be grown in higher latitudes in eastern Asia than in eastern North America. Rye, barley, and even cucumbers, can be grown at Yukutsk in eastern Siberia, in 62° N. (the same latitude as the mouth of the Yukon in Alaska, and Frederikshaab in Greenland), the barley being sown in the first days of May, and ripening about the middle of July—within two months and a half.

The land surfaces of the **Southern Hemisphere** are too narrow to exhibit the easterly increase in the extremes of temperature, especially since they do not extend into those latitudes in which that increase is most marked. One circumstance is, however, noteworthy regarding the climate of the temperate zone of the southern hemisphere, namely that it is generally colder, at least on the land, than in corresponding latitudes of the northern hemisphere ; so that the limit of cultivation of various plants is in a lower latitude to the south than to the north of the equator. A glacier descends in Chile to the water's edge in about lat. 46° S., a latitude corresponding to that of the middle of France in the northern hemisphere. The orange is not cultivated for its fruit in Victoria, except in the extreme north-west in a latitude one or two degrees below that of the southernmost point of Europe. In the South Island of New Zealand, which is in as low a latitude as the northern half of Italy, oats is the principal crop, as it is in Scotland and Ireland.

As the winds are the carriers of heat and cold it follows that the physical configuration of the land, apart from the direct effect of elevation, may indirectly affect temperature. Mountains, by obstructing winds, in some cases afford protection from cold winds, in others prevent certain districts from getting the benefit of warm ones. Temperature is also greatly modified by evaporation and condensation of water vapour, evaporation always tending to bring about a lowering and condensation a rise of temperature.[1] Heat is lost during the night by radiation, and since there is greatest loss of heat in this way where the atmosphere is dry, clear, and rare, there are great extremes of heat by day and cold by night in the interior of continents, especially at high elevations. Low temperatures prevail at high altitudes, but it is to be remembered that these low temperatures are those of the air. There is no diminution, but the reverse, in the strength of rays of the sun on any body directly exposed to them.

It is important to be clear as to the meaning of the diminution of mean temperature with altitude. This is not a phenomenon observable equally at all times of the day and year. A statement as to the rate of that diminution, usually given as equal to about 1° F. for every 300 feet of ascent, expresses the result of averaging differences of temperature in a vertical column of air or in adjacent vertical columns, at different times and in different situations, and in a great many cases it is of much more practical importance to observe that at certain times in certain situations the difference is the other way, the lower temperatures at the bottom, the higher on the upper slopes or even on mountain tops. This will be understood when it is borne in mind that various causes are at work affecting air temperatures. First it should be noted that the air is heated principally not by the direct rays of the sun, but indirectly through the warming of the surface of the earth which then imparts its heat in various ways to the air above. Naturally, therefore, when the surface of the earth is warm, the air is all the warmer the nearer it is to the surface, and this difference is all the greater on account of what occurs in connection with one of the modes of conveying the heat from the ground to the higher strata of the air, namely, by means of convection currents. The air nearest the ground expands in consequence of its greater heat and so becomes relatively light and rises. But as it rises it becomes subjected to less pressure and expands still more, and this expansion is accompanied

[1] The conversion of water into vapour, like the conversion of ice or any other solid into the liquid state, involves the expenditure of heat. That is, heat (in the scientific sense of the term) is used in the conversion, and is not available for raising or maintaining temperature. Meanwhile, of course, temperature may be maintained, and even raised, by external supplies of heat (as from the sun, or a fire).

by an instantaneous lowering of temperature permeating the whole mass. As long as the air rises and there is no condensation of the water-vapour in it into cloud, rain, snow or any other form of water, this cooling goes on at the rate of 1° F. for every 180 feet of ascent, a figure which does not express an average but states a fact observed with every rise of air, whether by day or night, in summer or in winter. The rate of cooling, however, is checked when any condensation takes place. But if the heating of the air above takes place from the ground upwards, so also in a large measure does the cooling at night. At night indeed every part of a column of air loses heat by radiation upwards into space, and the higher strata lose heat in this way most rapidly on account of the greater rarity and frequently also the greater dryness of the atmosphere. But the ground loses heat in this way, above all on clear nights, much more rapidly than any part of the air column, and that brings about a more rapid cooling of the air near the ground. The adjacent stratum is cooled by actual contact. The strata immediately above that are cooled by a more rapid radiation of heat downwards to the ground than upwards into space. The result is that, at the coldest part of a summer night, there is a regular increase of temperature from the ground upwards, a so-called inversion of temperature, at least up to the height of more than 2,000 feet above the ground, whereas the diminution of temperature in the same direction at the hottest period of a summer day may be equal to about 2° F. for every 300 feet of ascent. This inversion of temperature is important in cultivation as it gives rise to the 'frost pockets' mentioned below, so well known to gardeners. Indeed 'micro-climates' may occur even within the area of an ordinary garden which profoundly influence the growth of plants.

From this account it will be understood that the lowering even of the mean temperature with altitude will differ according to the nature of the superficial configuration. Isolated peaks, exposed on account of their isolation to ascending winds from all directions, will show a much more rapid rate of diminution than mountainous country in which a large extent of the solid crust is raised to a high altitude. Where we have an extensive high level tableland, or even high valleys out of reach of ascending winds, air several thousands of feet above sea-level may be as near the ground, that is, as near the heating surface, as air above a plain only a few feet above sea-level, and the high ground in this case will be more intensely heated than the low ground by sunrays falling at the same angle on both. In such a case the only circumstances that bring about a lower mean temperature at the higher latitude are the greater rarity and generally also the greater dryness of the atmosphere. These conditions prevent the air from taking up heat as rapidly from the ground by day and favour a more rapid cooling by night. The total lowering of

the mean temperature, however, is reduced to a minimum. Hence it is that it is possible to cultivate wheat in western Canada in the same latitude as Snowdon at as great a height as the top of Snowdon. At Banff, Alberta, at the height of about 4,600 feet, considerably higher than the top of Ben Nevis, the ordinary English garden flowers such as larkspurs, campanulas, sweet-williams, stocks, pansies, and marigolds flourish even in September, and at the same season at Lake Louise, about 5,700 feet above sea-level, eschscholtzias, asters, and other flowers bloom freely.

The facts just mentioned cannot but suggest that it is difficult to attach any clear meaning to isothermal lines drawn on maps representing land with varied physical configuration, based on observed mean temperatures reduced by a common multiplier to so-called sea-level temperatures, and at any rate will serve to bring home to every one that what we have to do with in economic geography is not sea-level temperatures but the temperatures actually observed, a point emphasised by the late Professor Herbertson in his well-known paper on 'The Thermal Regions of the Globe.'[1] The isothermal lines drawn over the sea on two of his maps serve to indicate the great differences of temperature on different coasts in the same latitudes. The map showing the duration of the period, with a mean temperature over 50° F., affords some indication as to how the temperature requirements of vegetation suited to the temperate zone are met, but it must be kept in mind that it does so only very broadly. It is not on mean temperatures even as actually observed that vegetation depends, but upon the actual temperatures experienced within a range that differs for different plants.

Differences in the range of temperature which different plants will stand make it important to observe the conditions in which exceptionally low temperatures are liable to occur on low grounds as compared with higher slopes. As heated air expands and rises so cold air contracts and sinks. In calm weather the air on mountain sides gets cooled by night more rapidly than on the valley bottoms. The radiation upwards is more rapid on account of the greater rarity of the air, and it starts from a lower temperature than at the valley bottom. Hence the air on the slopes becomes so heavy that it flows down the mountain or hill sides to the valley bottom, and there accumulates if there is no adequate outlet for it. Hence it is that, for example, in the choosing of sites for orchards in regions subject to low temperatures, the lie of the ground must be carefully studied. One must see that there is good air drainage, a free way of escape for descending cold air. Above all, one must avoid 'frost-pockets' or hollows in which cold air might accumulate like water in a lake. Where mountain valleys, in parts of the world with severe winters, are shut off from the prevailing winds, the mean winter temperature

[1] *Geographical Journal*, vol. xl., pp. 518–29.

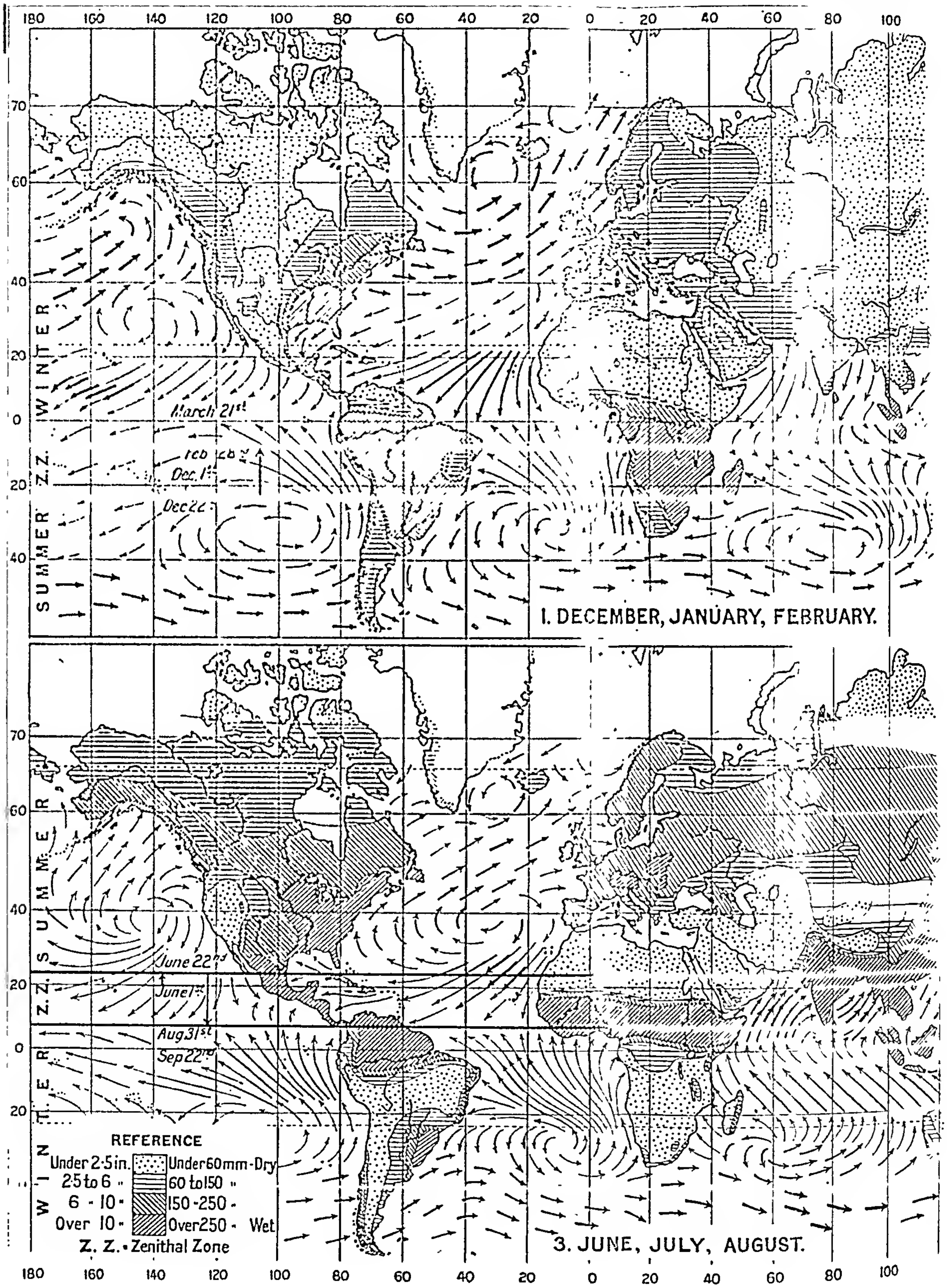
is lower in the valley bottoms than higher up, and the celebrated Austrian meteorologist and climatologist, Hann, pointed out that in such valleys in the Alps the human settlements for that reason are found on the hill sides, not in the lower parts of the valleys. For the same reason, in part of the Appalachian mountains cultivation is mainly confined to what is known as the thermal belt, high enough up to escape the extreme regions of winter. It is on the slopes of the hills, not in the valley bottoms, that wheat is grown round Yakutsk and in the upper Angara. In upland pastures sheep frequent the higher grounds at night.

As the great source of **moisture** is the ocean, for the most part the further inland a region lies the less chance has it of receiving an ample rainfall, unless there are special conditions favourable to the condensation of water-vapour. Water-vapour is condensed through the more or less rapid lowering of the temperature, and one of the most frequently operative causes in bringing about that reduction of temperature is the presence of mountains, obstructing moisture-laden winds, and thus forcing them to ascend and become cooled by expansion. Consequently, regions on the maritime side of mountains often have sufficient rainfall when those on the other side have not. In the tropics there is generally a more marked distinction between rainy and dry seasons than in most parts of the temperate zone. This distinction is most marked of all in the monsoon regions, in which the winter winds are naturally for the most part dry winds, whereas those of the summer months come heavily charged with moisture and bring about a very high rainfall in the parts more directly exposed to them. In these regions accordingly we have the combination of heat and moisture specially favourable to vegetation, and this characteristic is particularly noticeable in the parts of the monsoon areas belonging to the temperate zone, which are in consequence greatly more productive than regions in the same latitudes elsewhere.

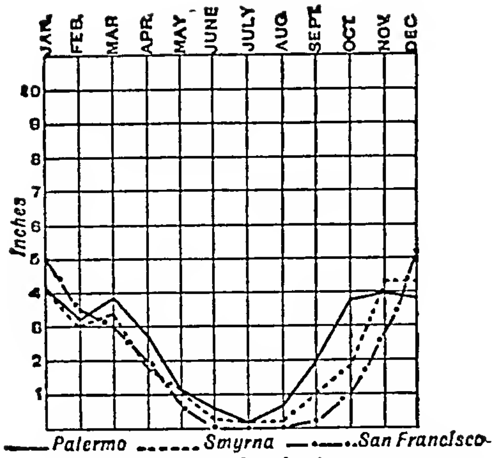
The important matter of the distribution of rainfall throughout the year is illustrated by the four seasonal rainfall maps and the diagrams on p. 29. In studying the maps of seasonal rainfall it should be kept in mind that seasons of heavy rain are also seasons of flood, and that even the normal floods of many regions with a high seasonal rainfall add greatly to the cost of road maintenance, and may render roads useless for long distance travelling by making the dry season fords impracticable. With the diagram illustrating the monsoon type of rainfall may be compared in the first place those for places in the trade-wind belt. The curves in the diagram of places on the east side of continents in that belt are all typical. During the summer months the areas of low pressure which are then found in the interior of continents have the effect of strengthening the trade-winds that tend to blow on the east side, which accounts

DISTRIBUTION OF ME,

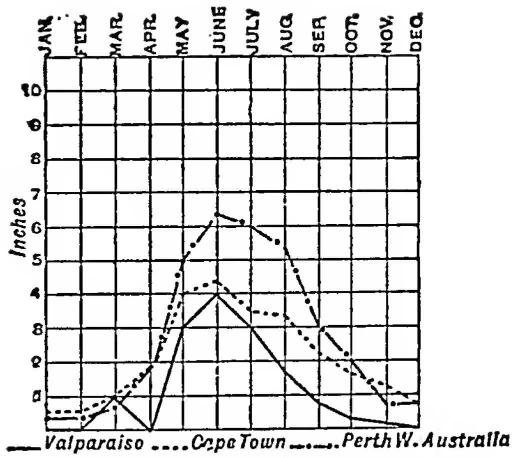
WINDS F



Copyright

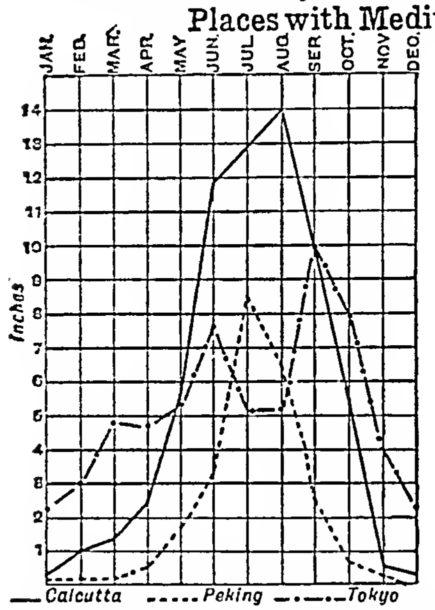


Northern Hemisphere

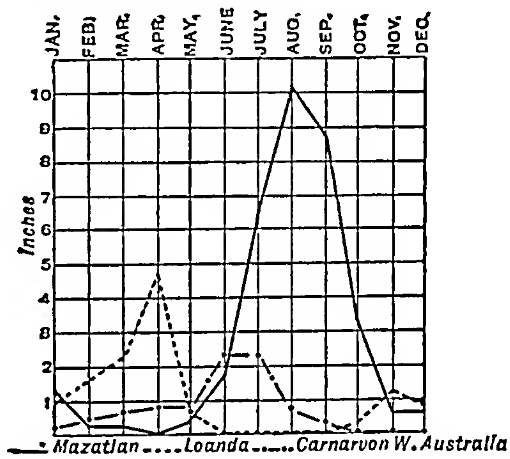


Southern Hemisphere

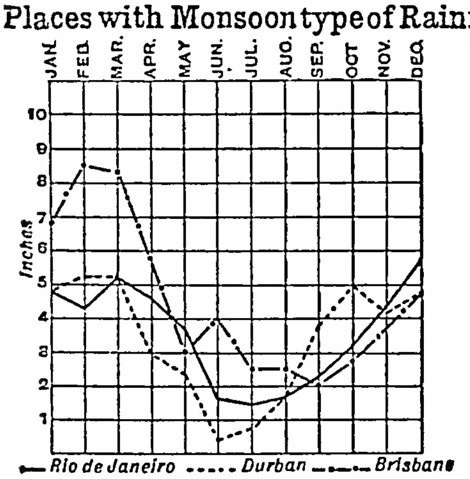
Places with Mediterranean type of Rainfall.



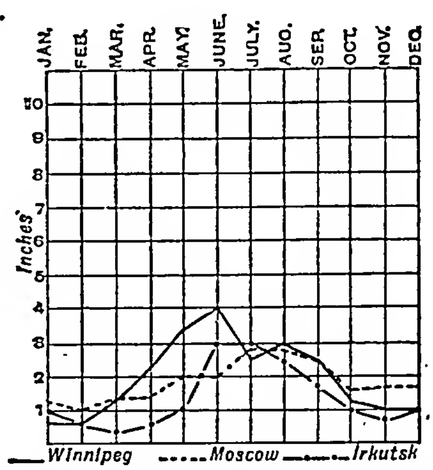
Places with Monsoon type of Rainfall.



Places in the Trade wind belt on the west side of Continents.



Places in the Trade wind belt on the east side of Continents.



Places in North Temperate zone with continental type of Rainfall.

TYPICAL RAINFALL DIAGRAMS.

for the marked preponderance of summer rain indicated by the diagram. On the east side of such regions accordingly we have a repetition of the combination met with in the monsoon areas. The rainfall curves in the diagram for places in the trade-wind belt on the west side of continents illustrate the variety of effects due to physical configuration and outline rather than the characteristic rainfall distribution of those regions. In those regions it must be remembered that the tendency for the winds to blow away from the land is partly counteracted during the summer by the areas of low pressure in the interior tending to set up an indraught from the west. That indraught is, however, mostly feeble, and the rainfall is consequently so scanty, except in very low latitudes, that those coasts are almost unpeopled, one consequence of which is that there are no rainfall stations to furnish typical curves.

Enough has been said to indicate that climatic conditions vary widely from one part of the world to another not only in the amount and season of rainfall, the degree and degree of variability of temperature but also in many other ways. At the same time identical or almost identical climatic conditions recur in several parts of the world—it may be in equatorial Africa, South America and the East Indies or it may be (with the seasons reversed) in the South Island of New Zealand and in Scotland. The important conception of ' major climatic regions ' was introduced to British geographers by the late Professor A. J. Herbertson of Oxford. His regions were based on conditions both of temperature and rainfall. The Herbertsonian regions, or modifications of them, are widely used, though in America greater use is made of the climatic regions devised by the German climatologist, W. Köppen. Köppen's regions are defined with greater rigidity and delimited by arbitrarily chosen temperature limits which sometimes have little corresponding precision on the ground. Another mathematically precise classification introducing the idea of ' precipitation efficiency ' rather than actual rainfall has been introduced by the American climatologist, Thornthwaite. On the other hand, the American ecologist, F. E. Clements, has stressed the importance of plants as indices of the whole complex of significant climatic factors so that the observed natural vegetation becomes the best indication of a climatic region.

The importance of the concept of climatic regions in commercial geography is in the applicability of lessons learnt in one part of a given region to all other areas having an identical climate. The climatic conditions of parts of Canada are repeated exactly in Russia, and so lessons learnt by scientific experiment in the one area can be applied in the other. If the Canadians are very successful in breeding a new type of wheat which will ripen farther north and with a shorter summer than existing varieties, the results of these experiments are immediately of great value to the Russians. On

the other hand, serious mistakes have often been made in the past in trying to transfer customs or procedure from one part of the world to another where they are not suitable. Thus some of the early English settlers in Ceylon saw no reason why they could not grow the crops which they had grown in England, so they took with them oats and barley and wheat and tried to grow them. When the Pilgrim Fathers went from some of the country districts of England and settled in New England they cleared the forests and built for themselves homes and cultivated the ground believing that they had the same soil and climatic conditions as they had left behind them in England. There are many areas where they settled where the soil was very poor, and to-day much of the land that they so laboriously cleared is being abandoned ; it is not good enough, and really has never been good enough, for cultivation.

Many important commercial products can only be produced in one type of climate. The rubber-tree (*Hevea*) is a native of the climatic region of the Amazon basin of South America where it is always hot and always wet ; the rubber-tree cannot be grown where there is a long, dry season or where there is a cold season, but it can be grown in all those parts of the world where the climatic conditions are the same as in its own home area. Indeed, nearly all the rubber of commerce comes to-day from the gigantic plantations of Malaya, Ceylon, and the Dutch East Indies. Plantations were started near Calcutta, but a long dry season there makes the cultivation of *Hevea* impossible.

I. Climatic Regions of Low Latitudes

The Equatorial Regions.—The Equatorial Climate (Köppen's AA′r) is found in a belt on either side of the equator, extending roughly between 5° north and 5° south of this line. The characteristic vegetation is tall, evergreen forest where it is always wet and always hot so that the forests are never leafless. It might be called also the climate of the hot, wet selvas (using a local name for the Amazon forests). The temperature is high all the year and there is very little variation between the hottest month and the coolest month, and there is usually quite a small difference between day and night. The average for the year is about 78° or 80° F., and the range between the hottest and coldest month is usually less than 5°. Although the atmosphere is always hot and steamy and the temperature is uniformly high, the thermometer very rarely rises above 100° F. and frequently does not rise above 90° ; on the other hand, it does not as a rule fall much below 70°. In the interior of the great forests there is little movement of the air, the climate is very tiring, but in situations near the sea or on islands it is often very pleasant, for the land and sea breezes give a welcome movement of the air—a cooling sea

breeze by day and a land breeze by night. The rain falls at all seasons of the year and there is no dry season except in relative amount. In the early part of the day bright sunshine causes much evaporation and an upward current in the atmosphere ; the ascending moisture-laden air becomes cooled and clouds form during the afternoon. The convectional rain which follows is often accompanied by thunder and falls in torrential downpours, usually of short duration. By the evening the sky is clear again. There are usually two seasons in the year which are wetter than the rest ; in most cases the rains are at their maximum a short while after the period when the sun is shining vertically. Typical of the equatorial lands is the Belt of Calms or Doldrums where there is no marked wind or wind direction. Island stations have light and variable breezes but some regions near the equator are influenced by the trade-winds or monsoon-winds which are typically developed farther to the north or farther to the south. The equatorial region is nearly always one of heavy rainfall, 80 inches of rain a year is about a typical rainfall. There are three main areas : the Amazon basin of South America ; the Congo basin of Central Africa ; the islands of South-Eastern Asia and the neighbouring parts of the mainland, including Malaya.

In high plateaus near the equator the temperature is very much lower and so the ' Ecuador type ' of climate is found, typically on the high plateau of Ecuador at an elevation of 8,000 to 10,000 feet. Here the average temperature is only 55°, and this has been described as the ' land of eternal spring.'

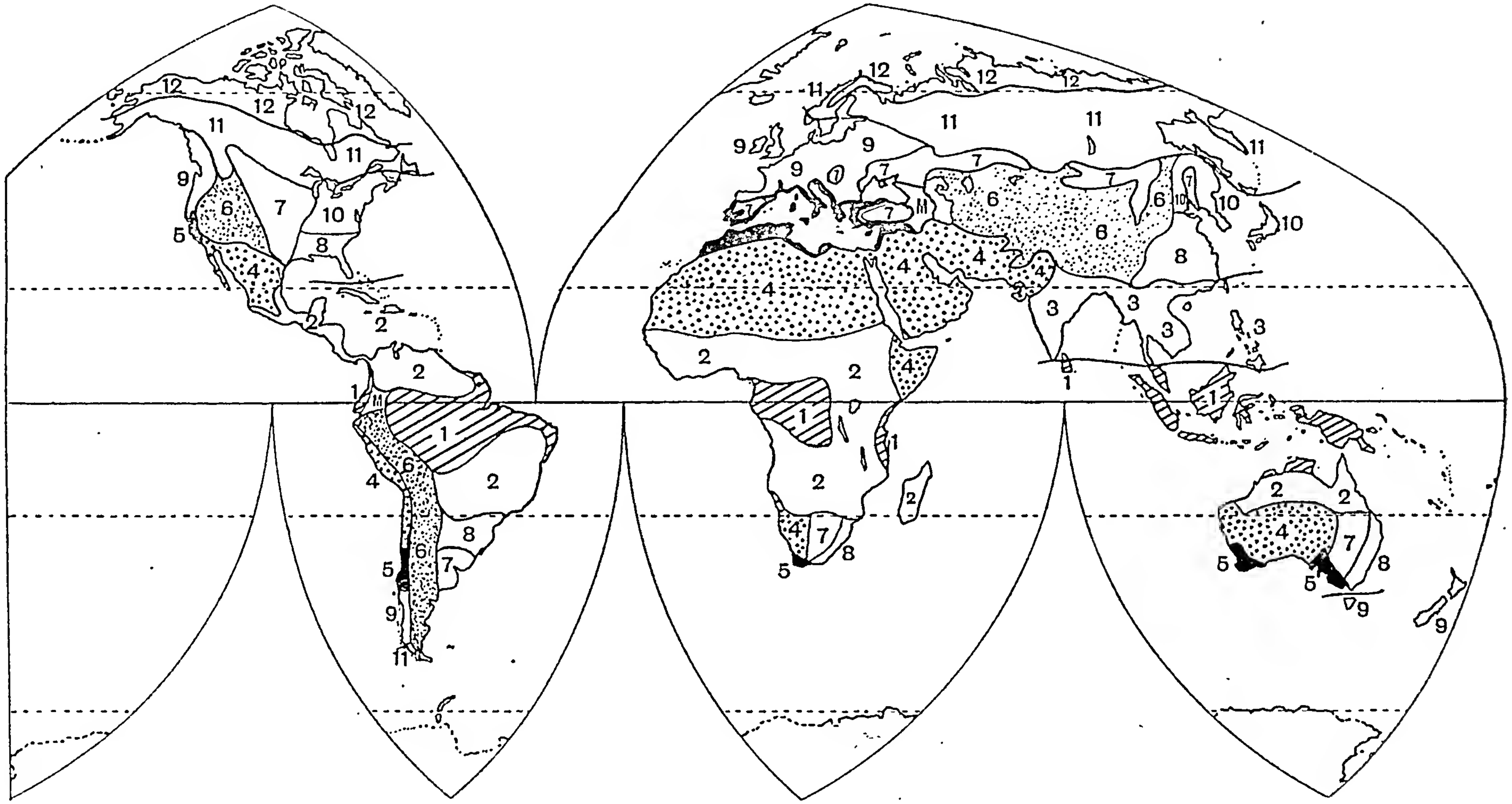
There is a fierce struggle in the forest, not for moisture of which there is an abundance, but for air and light. Giant trees, nearly all having tall unbranched bolls with a crown of leaves at the top, form a close mass often so thick that little sunlight reaches the ground. Many of the trees are of hard-wooded species and there are two major difficulties in exploiting these forests. One is the great variety of trees, so that the extraction of one or more particular types of timber is extremely difficult. The other is the character of the timber itself—usually hard and costly to work though often forming magnificent ' cabinet ' wood. Some towns such as Manaos in the heart of the equatorial forests of South America actually import softer, more easily worked, building timber from the timbered regions of North America. The struggle for light and air has resulted in the existence of large numbers of woody climbers ; the trees by which these have climbed may afterwards decay and leave the climber hanging from the branches of neighbouring trees and the coils forming tangled masses on the ground. This is one reason why the equatorial forests are so difficult to penetrate. Many smaller plants, including orchids and ferns, find a foothold in the higher branches of the trees (growing

there as ' epiphytes ') and thus reach the light. In the denser forests the ground may be almost clear of vegetation except decaying matter, but in open forests there is a luxuriant growth of broad-leaved herbs. In the denser forests the animal life is almost restricted to the treetops and all groups of animals can exhibit members especially adapted to this particular habitat. Where man is concerned the equatorial climate has been well described as a good servant but a bad master. In the dense forests of South America and much of the Congo the climate is still the master ; and the forests are sparsely inhabited by races backward both physically and mentally. On the other hand, the Malays and the Javanese enjoy a life of comparatively high culture. The white man has made the equatorial climate his servant, particularly in Malaya, Ceylon, and the East Indies. The forests there have given place to plantations of rubber, oil-palm, cacao (cocoa), and sugar. For the white man, too, these are far from being the unhealthiest or most uncomfortable parts of the world. The great danger is the absence of variation in the climate.

The Tropical Regions and the Tropical Monsoon Regions (Köppen's Awg).—The word ' tropical ' is commonly used in such a loose way that it conveys little more than the idea of heat, but geographers have assigned a more precise meaning to the word tropical as applied to the tropical climate. The tropical and tropical monsoon climates are found typically within the Tropics on either side of the equatorial belt. In contrast to the equatorial regions there is a marked difference between the temperatures of the hot and cool seasons of the year. Around the equator or in maritime situations where the rainfall is heavy, the difference of temperature may be small, but in other parts there is frequently as much as 30° or 40° between the hottest and the coldest months. The difference between day and night temperatures is correspondingly large.

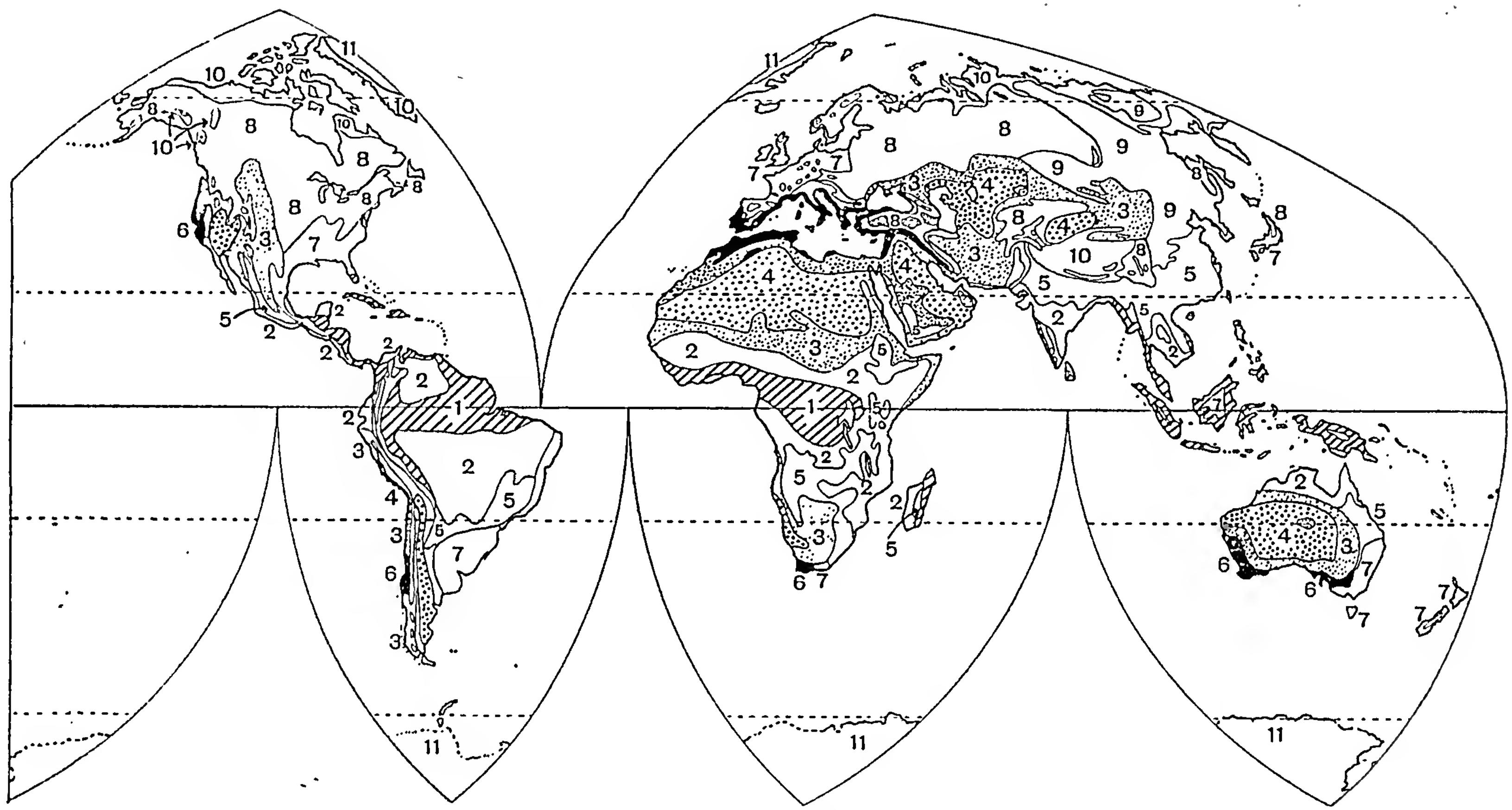
The tropical regions lie between the equatorial forests on the one side and the hot deserts on the other. From the point of view of rainfall there is a gradation of from 80 inches a year or more on the forest edge to 15 inches on the other edge ; at some of the wettest stations in the tropical belt the rainfall may be as much as 200 inches a year. There is, however, a distinctly dry and distinctly wet season, and it is usually possible to distinguish between : (*a*) a cool dry season followed by (*b*) a hot, dry season when the land becomes greatly heated and the highest temperatures are recorded and (*c*) the rainy season.

With the coming of the rain begins a lowering of temperature, but the rain comes in the hot season of the year, while the cooler months are practically rainless. This season of intensive rainfall favours the growth of grass, but where there is sufficient moisture to give a constant underground supply trees also flourish. Thus



MAJOR CLIMATIC REGIONS OF THE WORLD (after Herbertson, modified by Stamp).

Climatic Regions of Low Latitudes.	1. Equatorial. 2. Tropical. 3. Tropical Monsoon. 4. Hot Desert and Semi-Desert.	Climatic Regions of Middle Latitudes.	5. Mediterranean. 6. Temperate Desert and Dry Land. 7. Mid-Latitude Grassland. 8. East Coast Margins.	Climatic Regions of High Latitudes.	9. Deciduous Forest. 10. East Coast Margins. 11. Coniferous Forest. 12. Tundra.



CLIMATIC REGIONS OF THE WORLD (after Köppen).

A. Tropical Rain-Climates. { 1. Hot Wet Forest Climate. 2. Periodically Dry Savana Climate.

B. Dry Climates. { 3. Steppe Climate. 4. Desert Climate.

C. Warm Temperate Rain Climates. { 5. Warm Winter-Dry Climate. 6. Warm Summer-Dry Climate. 7. Cool Temperate Climate.

D. Boreal Climates. { 8. Damp Cold Winter. 9. Dry Cold Winter.

E. Snow Climates. { 10. Tundra Climate. 11. Frost Climate.

in tropical and tropical monsoon lands four belts of vegetation may be distinguished : (*a*) Near the equatorial belt, provided the rainfall is sufficiently heavy, there is forest differing but little from that of the equatorial belt. (*b*) Where the rainfall drops below about 60 or 80 inches this passes into a forest in which the trees are deciduous, losing their leaves or having a resting period during the heat of the year. The forests of Burma and parts of India famous for their teak, sal, and other timbers belong to this region, as do many of the forests of West Africa. (*c*) Then comes the characteristic grassland of so much of Africa, the great stretches of grassland with occasional trees, or savana. In India, where it is too dry for the growth of monsoon forest, its place is taken by rather a scrubby kind of woodland with a limited amount of grass. (*d*) Towards the desert areas the vegetation becomes poorer and poorer, the trees are replaced by spiny bushes and the grass is found only in sparse tufts.

In the drier parts the reliability of the rainfall from one year to another is a serious matter. Some years the fall is sufficient to ensure good crops, whilst in other years a poor rainfall results in famine conditions.

The animals are of two main groups—(*a*) the swift-footed, vegetable-eating animals such as the antelope and giraffe that take refuge from their enemies in flight ; (*b*) the carnivores such as the lion and the leopard which prey upon the members of the first group.

Man in the savana is primarily a hunter ; just as the grassland is able to support vast numbers of grass-eating animals, so man is able to rear great herds of cattle and so becomes a pastoralist. The natural grass which flourishes in the savana may be replaced by the cereal grasses and so man becomes an agriculturalist. The more important crops of the tropical regions, like the occupations of man, vary (*a*) with the amount of rainfall, and (*b*) with the degree of development. India affords an example of a very densely populated region and Africa or parts of South America of the more sparsely populated tracts.

In areas with more than 80 inches of rain a year rice is the staple food of the people and almost the only crop, as in India. The main danger is not a lack of water but one of flooding : protective works are often necessary to prevent floods.

In areas with between 40 and 80 inches of rain a year rice is again an important food crop, largely replaced by maize in Africa, while sugar and oil-seeds are other important crops.

In areas with between 20 and 40 inches of rain (dry belts) the land is normally covered with scrubland, thorn forest or grassland ; different types of millet or Guinea corn are the staple grains of the people as in all the warmer parts of India and in tropical Africa, though in regions such as northern India wheat and barley may be

grown as winter crops. Sesamum and various oil-seeds are cultivated and cotton is a characteristic crop. There is always the danger that the rain may be less than average and that famine may thereby result.

In the tropical regions cattle are reared in numbers and in Africa form virtually a measure of wealth of individuals or tribes. Unfortunately quantity rather than quality is the criterion adopted. In many parts of Africa the destructive tsetse fly is very much in evidence and limits cattle rearing. Sheep may be important as they are in India.

The Hot Desert Regions (Köppen's BW) lie on the poleward side of the regions with a tropical or tropical monsoon climate. They are confined to high-pressure belts where the currents of air are descending and the winds blow outwards so that there are no moisture-laden winds coming in from the ocean. They are mainly on the western side of the land masses because on the eastern side a certain amount of rain is caused in these latitudes by the trade-winds. In the hot desert regions there are few clouds and the sun pours down with unmitigated force on the unprotected soil, while the absence of cloud also permits rapid radiation of heat and the nights are often very cold. There is thus a big contrast between day and night and between the hot season, when the sun is vertically overhead, and the cold season. There is further little or no rain to exercise a cooling influence on the temperature ; many of the deserts are low-lying so that there is not even altitude to temper the heat of summer, with the result that the highest temperatures of the world are recorded in these regions. Thus, El Golea in the Sahara has an average temperature of 93° in July, whereas in January its average is only 39°, about the same as London for the same month. Jacobabad, in north-west India, has one of the highest recorded average temperatures in the world for the month of July—98° F. On the margins of the desert nearest the equator the desert proper fades into semi-desert as soon as the rainfall reaches 9 or 10 inches a year ; this in turn passes gradually into the grasslands of tropical regions. On these margins of the deserts such rain as does fall comes mainly in the same season as it does in the tropical lands, that is to say, in the early summer. On the poleward regions, on the other hand, the desert fades gradually into Mediterranean scrubland where the rain comes in winter. Cairo with 1·3 inches of rain a year is an example of this type. The largest deserts occur in the Northern Hemisphere, for the simple reason that the land masses are there broader. The great Sahara stretches almost continuously from the Atlantic to the Red Sea and then eastwards over Asia to the borders of Baluchistan and the great Indian desert. North America has the deserts of the Mexican and United States borders, South America the Peruvian and north

Chilean deserts that occupy the area between the Andes and the Pacific Ocean. In South Africa the Kalahari Desert stretches right to the Atlantic Ocean, whilst in Australia a large area has a rainfall of less than 10 inches a year, the great dry heart of the continent.

There are few deserts where absolutely nothing grows; over much larger areas there is some vegetation, often sufficient to support at least some animal life. The plants have various means of storing water; some have very long roots which go down to great depths and so find water, others have special stems and leaves in which water can be stored up, while many are provided with spines and thorns to prevent their being readily eaten by animals. Of special importance are the fertile areas or oases occupying hollows where an underground supply of water comes sufficiently near the surface to be accessible to vegetation. Some oases may consist merely of a clump of trees surrounding a pool or well and where the typical tree is the date-palm, but other and more important oases are areas of several hundred square miles and may support a big population as in the heart of Arabia.

The sparse population of the deserts falls into three groups: (*a*) the wanderers who move about from place to place, in the old days with camels, or for shorter journeys with mules, and act as carriers of goods from one desert margin to another, or at other times form bands of nomadic robbers; (*b*) the settled people of the oases who devote themselves to growing grain, rearing cattle, sheep, goats, horses and camels, and the cultivation of such desert plants as the date-palm—to this group belong many of the Arabs; (*c*) the settled population of miners, attracted by mineral deposits independently of climatic conditions, as for example in the nitrate fields of Northern Chile or the goldfields of Western Australia.

In the desert regions some interesting influences of climatic conditions on man can be traced. The desert has often produced people with a philosophical outlook, such as the ancient Egyptians and the Arabs, learned in Mathematics and Astronomy. Over long periods the inhabitants of oases may live peacefully and happily, but the result of a dry year, or especially a succession of dry years, or the failure of the underground water supply, is to drive the inhabitants abroad in search of other means of sustenance. Many racial migrations due to these factors may be traced in the pages of history, the arrival of the Shepherd Kings in Egypt, the wanderings of Abraham which led him to the Promised Land, the recent migrations in Arabia and the troubled politics of that country, may all be traced to these causes.

On the whole deserts have acted as barriers to civilisation and to the movement of human beings. The Sahara Desert still separates the white and negro races of mankind, through the centuries more difficult to cross even than the open ocean.

II. Climatic Regions of Middle Latitudes

Outside the tropics there is usually a considerable difference between the western and eastern margins of the great continental masses. On the western margins the Mediterranean type of climate passes inland with decreasing moisture to temperate desert regions, or in middle latitudes to grasslands, the so-called temperate grasslands which are characteristically found in the interiors of continental masses. On the eastern margins again is another type of climate.

The Mediterranean Regions (Köppen's CSa).—One of the most distinctive and best known of all the climatic types is that known as the Mediterranean, which is characteristic of the lands surrounding the Mediterranean Sea. Like the hot deserts which border them on the side nearer the equator, these regions are hot and dry in the summer, with out-blowing winds : in winter, however, they come under the influence of the westerly wind belt and enjoy moist, mild winters. This is the typical winter rain climate, contrasted with the typical summer rain climate of the tropical or tropical monsoon lands, but the Mediterranean regions are outside the tropics and so on an average are cooler. Sunshine is a typical attribute of Mediterranean lands, almost cloudless skies in summer and even in winter clouds are less numerous than would be expected.

The Mediterranean climate is restricted to the western sides of the continents, roughly between latitudes 30° and 45°. The largest area is that found round the Mediterranean Sea, while others occur in North America (parts of California), South America (central Chile), South Africa (south-western Cape Province), and Australia (south-west of Western Australia, South Australia, and part of Victoria). Here during the hot summer the trade-winds in all cases are blowing off-shore. A typical Mediterranean climate could not exist on the eastern side of a continent where the trade-winds blow from the ocean and are moisture laden. Within the Mediterranean region there is considerable variation in the details of the climate especially round the large Mediterranean Sea. Eastwards the winters tend to be colder, but the coldest month has usually an average temperature of over 40°, whilst in the more typical parts of Mediterranean lands the coldest month has a temperature of over 50°. The summers are both hot and dry with a mean temperature of over 70°, in many areas of over 80°. The rainfall varies but is usually small, between 10 and 40 inches a year in typical cases ; on mountains with exposed situations it may be much higher.

The climate does not favour shallow-rooted herbs and grasses which require light showers during the spring and early season when they are growing ; it favours, on the other hand, deep-rooted trees and shrubs which are able to withstand the long dry summer.

Many of the trees have small leathery leaves or leaves with a coating of wax to retain moisture, others, such as the olive, have leaves covered with fine silky hairs, all of which devices are designed to prevent excessive loss of moisture through transpiration in the hot summer. Some of the plants, such as the vine, have exceptionally long roots. In those regions where forests occur, even forest trees are specially protected; the thick bark of the cork-oak of Portugal is an example of this. The dry summer conditions of Mediterranean lands are ideal for the ripening of fruit; the typical ones are the citrus fruits, oranges, lemons, and grapefruit, together with a great variety of fruits from trees which lose their leaves in the winter, such as peach, pear, apricot, and apple as well as the olive, almond, fig, mulberry, and vine. Of grain certain types of wheat and barley will grow well, having been adapted by man to the climatic conditions. Deficiency of rainfall is often a serious drawback, and so irrigation has played a large part in many Mediterranean regions. The Mediterranean lands have harboured many of the great civilisations of the world, Greece and Rome, Crete and Carthage.

The Temperate Desert Regions (Köppen's BWk).—The middle latitude deserts cover enormous areas in the heart of the land-mass of Eurasia and considerable tracts of the heart of North America, but in South America they are represented only by the Patagonian Desert. In the Northern Hemisphere they occupy flat areas cut off from the ocean by mountain barriers and by distance. In general the mid-latitude deserts are characterised by high ranges of temperature and a very low rainfall. Generally, too, they form large areas of high pressure with great masses of cold air in winter and areas of low pressure with in-blowing winds in summer. The scanty rainfall occurs mainly in the summer except in those regions which border the Mediterranean countries—*e.g.* Iran.

Elevation and latitude permit of a subdivision of temperate deserts into several types: (*a*) the *Tibet type* occurs on the high plateaus of Central Asia, over 11,000 feet, and in Bolivia in South America, again over 11,000 feet. Many parts of the Bolivian plateau are almost too well watered to be described as desert; (*b*) the *Iran type*, characterised by the enclosed plateau of Iran or Persia, forms a transition to the hot desert type. Similar areas occur in North America round Salt Lake City; (*c*) the *Gobi or Mongolian type* occurs at lower elevations farther away from the equator.

Mid-latitude Grassland Regions (Köppen's BSk).—The mid-latitude grassland regions are also called the Temperate Grasslands or the Temperate Continental Regions, but the word 'temperate' is an unfortunate one because it is in these regions that great contrasts are found between summer and winter.

There are great tracts in the heart of the land mass of North

America and the land mass of Eurasia which are far removed from the moderating influence of the sea. There are no cooling sea-breezes to counteract the extreme heat of summer, nor are there warm ocean currents and pleasant westerly winds to mitigate the extreme cold of winter. When the land becomes heated in spring, low-pressure areas form and the winds blow from the ocean sufficiently laden with moisture to bring a moderate rainfall. This rainfall comes mainly in the spring and summer, and affords conditions more suitable to grass than to trees. So in these regions are found the great mid-latitude grasslands of the world—the Prairies of North America, the Steppes of southern Europe and southern Siberia. The winters are very long and very severe, the summers short but hot. Average temperatures below 0° F. are common in winter, but the three hottest months usually have temperatures over 60° and frequently over 70°. In the Southern Hemisphere the land masses are so much narrower that the extreme continental type does not occur. In South America, however, the Pampas, cut off by the high Andes from the westerly winds of the south Pacific, enjoy a comparable though much more moderate climate. In South Africa grassland is found on the surface of the lofty South African Plateau. Here temperatures are much higher, snow being a rarity, and the existence of the grasslands is due largely to elevation. The Murray-Darling basin in Australia has also a modified continental grassland climate.

The grass is usually lower and less coarse than in the tropical grasslands, and the rolling plains are usually treeless. The contrast between the tender green of the spring, the brown, dried-up wastes of late summer, and the boundless sheet of snow in winter is characteristic of these regions of the Northern Hemisphere. The animals, as in the Tropical Grasslands, are divided into grass eaters, swift of foot to escape from their enemies, and the carnivores, amongst which man must really be classed.

Primitive man, as a native of the grasslands, is primarily a hunter, as were the Red Indians of the Prairies. The second stage in human development comes with the domestication of such animals as the sheep and goat, the ox and the horse. Pastoral industries become of supreme importance, and man is nomadic, wandering about with his flocks and herds in search of fresh pastures. Droughts and a consequent shortage of pasture have repeatedly led, throughout history, to great movements of these nomadic peoples and raids on the settled population of surrounding lands. It is interesting to note that in the grasslands of the Southern Hemisphere the rearing of sheep is still the first industry, as in Australia, South Africa, and parts of the Argentine. In Canada and Russia the extremes of winter cold are too severe for sheep rearing to be really successful; but a climate so favourable to native grasses has naturally

proved favourable to those grasses which man has helped to perfect as the main cereals. These grasslands have become the world's granaries, from which the deficiencies of the industrial countries are made up. Except in South Africa, where maize is the leading cereal, wheat is the crop of first importance in international commerce, followed by barley, oats, and rye. The Prairies, the Pampas, the Veld of South Africa, and the Downland of Australia are already well tilled; but there are still areas to be developed in Asiatic Russia. One large area of rather dry grassland remains undeveloped in Mongolia and Manchuria, where Chinese settlement is penetrating gradually along the fringes.

In the grasslands of the Southern Hemisphere, particularly in the Argentine and Uruguay, cattle rearing is important; but there is a distinct tendency for ' bread ' to oust ' meat ' in the competition for these lands. There are no longer the numerous huge ranches that formerly existed; they are being broken up, and wheat-farming becomes of greater importance. Hence the need for finding new lands for meat production, and the utilisation of the Tropical Grasslands.

East Coast Margins (Köppen's CW).—On the eastern side of the land masses in the same latitudes as the Mediterranean lands of the western side there are regions which in temperature are roughly comparable, but where the rainfall comes mainly in summer. These regions are sometimes called the Warm Temperate regions, but actually again the word ' temperate ' is not very descriptive because of the contrasts which are often found between summer and winter. Nor is there one actual type of climate; any one of the particular regions has its own particular features and the areas are (*a*) the south-eastern states (the cotton lands) of the United States of America, (*b*) the greater part of China, (*c*) the south-eastern coastlands of Australia, and (*d*) of South Africa, and (*e*) the region of Uruguay and south-eastern Brazil in South America. The south-eastern States have a well-distributed moderate rainfall throughout the year, usually with a maximum in the latter part of the summer, when the rain-bearing winds from the ocean flow in towards the low-pressure areas created by the heat in the interior of the continent. The economy of this region is almost entirely bound up in the production of cotton. Central and northern China form part of the great ' Monsoon ' region of Asia. The climate differs from that of India and southern China in the coldness of the winters. The rainfall, like that of India, is due to the development of a low-pressure centre, towards which rain-bearing winds from the ocean blow. While India is protected from the cold winds in winter by the Himalayas, China is not so fortunate. Bitterly cold winds blow outwards from the heart of Asia towards the sea throughout most of the winter, bringing the temperature over much of the country

down to freezing-point or below. The temperature of Peiping is well below freezing in January. Snow falls commonly over the greater part of central and northern China. The summers, however, are both hot and wet, favouring the growth of rice in the south, whereas millet and wheat are the principal grains farther north. Cotton is a leading crop in central China.

In the three continents of the Southern Hemisphere, climatic conditions in the three corresponding regions are somewhat similar (Eastralian type of Eastern Australia). The rainfall is well distributed throughout the year, with a summer maximum derived mainly from the trade-winds. But the southern continents are not broad enough to develop large high-pressure centres in winter with cold, out-blowing winds; so the southern regions are much more temperate and have very much milder winters.

Though the natural vegetation varies from country to country high forest is typical: evergreen where the rainfall is sufficiently well distributed. These 'Rain Forests' often exhibit a luxuriance of growth rivalling the Equatorial forests, but they are more open. Palms and tree ferns are noteworthy in many areas. In the Gulf States there are both broad-leaved and coniferous forests; from the latter the well-known pitch pine is obtained. China has been very extensively cleared of her natural vegetation, so that it is very difficult to know what was the original forest cover. It should be mentioned that Japan has this type of climate, but in her case the conditions are modified by the position of the country as an archipelago. Sufficient has been said to indicate that these regions are eminently suited to human occupation and development. The valleys of central China, with their rice, cotton, tea, and silk, resemble Monsoon India, or rather exceed it, in their density of population, and include the most densely populated agricultural tracts of the whole world. The density may be upward of 3,000 to the square mile—3,000 people who find their sustenance throughout the year from the small tract of land afforded by one single square mile. The Gulf States of America are the world's storehouse of cotton with the Maize Belt immediately to the north. The eastern coastal strip of Australia and the warm coastal belt of Natal have both attracted a large population. There are considerable untouched forest areas, however, in the interior of South America—untouched largely because they are swampy and unhealthy.

III. Climatic Regions of High Latitudes

The Cool Temperate Oceanic Regions (Köppen's Cf).—On the western margins of the continents on the poleward side of Mediterranean lands are regions which lie constantly in the belt of the variable westerly winds—the so-called 'Anti-Trade' wind belt—and

so are under the influence of cool, rain-bearing winds from the ocean the whole year. The two characteristics, small range of temperature between summer and winter and a well-distributed rainfall throughout the year, are at once obvious. The westerly winds do not blow as steadily as the trade-winds, but rather as a succession of eddies and whirls—cyclones and anti-cyclones. Residents in north-western Europe know well the prime importance of the cyclones and anti-cyclones in determining local weather conditions. The largest area having this type of climate is north-western Europe, but British Columbia and the north-western United States form another important area. In the Southern Hemisphere there is a small tract in southern Chile, but no part of Africa lies sufficiently far south, whilst in Australasia only Tasmania and New Zealand (especially the South Island) are typical. In Europe, owing to the drift of warm water which is the continuation of the Gulf Stream, the mild winters characterising this type of climate extend exceptionally far north, there being no land barriers. Conditions are most truly oceanic, that is, the annual range is least, near the western coasts. The winters become steadily colder as one goes eastwards and the summers slightly warmer; so it is customary in Europe to distinguish two subdivisions: (*a*) the North-West European type, where the average temperature of the coldest month is above freezing—averaging about 40°; (*b*) the Central European type, where the average temperature of the coldest month is about or below freezing. The rainfall is well distributed throughout the year, but the total amount varies somewhat widely. In the west the mountains are the wettest part, the plains, lying to the east of the mountain ranges, are the driest. Some parts of the British Isles have a rainfall of over 80 inches, as in the Lake District, whilst in the east of England the rainfall drops to little over 20 inches, and is as low as 18 inches in eastern Germany.

This so-called Cool Temperate climate is the natural home of the Temperate Deciduous Forests. The delicately tissued leaves are easily injured by winter frosts, and the trees have made the winter their resting period. The very name of the 'fall' of the year, though replaced in England by the less descriptive 'autumn,' is indicative of the marked nature of the phenomenon of leaf fall. Many of the trees of these deciduous forests yield valuable hard-wood timbers, more easily worked than the timbers of Equatorial lands, but hard relatively to the softwood timbers of the coniferous forests. Well-known examples are the oak, elm, maple, beech, and birch. Deciduous forests formerly covered most of north-western and central Europe, only interrupted by highlands clothed with evergreen forests or by tracts of moorland and heathland. In North America the mixture of several species of evergreen conifers—usually predominant—gives the forests a somewhat different aspect.

The Cool Temperate climate is the one perhaps most favourable to the development of the human race. It is sufficiently cold to necessitate manual work for the maintaining of bodily warmth in winter, but the summers are never so hot as to make outdoor work unpleasant. Individuals and races seem to develop somewhat more slowly than in tropical climes, but their maturity is more permanent when it is attained. Most of the great industrial countries of the world—Britain, France, Germany, Belgium, and Czechoslovakia—are situated in this region. Over the greater part of Europe the natural vegetation—the forest—has been cut down to make room for agricultural, pastoral, and industrial development. All the important temperate cereals—wheat, barley, oats, and rye—flourish, at any rate in the drier parts, with maize in the warmer parts. The natural fruits include apples, pears, and a number of others. In the drier regions sheep flourish on the hill-pastures ; in the wetter areas the grass grows richly and affords excellent pasture for cattle. The corresponding area in North America is equally suited for development except that much of British Columbia is too mountainous for settlement ; and in the deep valleys which separate the mountain ranges the rainfall is often extremely low, some parts getting no more than about 5 inches a year. The mild winters of such places as Vancouver form a pleasant and interesting contrast to the severe winters of the prairies of the heart of Canada. New Zealand—sometimes called the Brighter Britain of the South—forms an interesting example of modern development in the Southern Hemisphere of this type of climate. Only Chile's area, with too great a rainfall and too great an extent of mountainous country, remains undeveloped.

East Coast Margins (Köppen's DW).—The eastern margins of the great land masses are far colder in winter than the corresponding western margins. Many of the ports, *e.g.* Montreal and Vladivostok, are ice-bound, though the summers are hotter than in corresponding latitudes on the west coasts. In the north-eastern United States, the Maritime Provinces and the St. Lawrence valley of Canada, there is a well-distributed rainfall which permits of dairy and arable farming. The corresponding region in Asia, in Manchuria, is a region where the Monsoon winds still play their part ; so it is the summers which are hot and moist, the winters extremely cold and almost rainless. The land masses of the Southern Hemisphere are not sufficiently broad for this type of climate to be developed.

The forests which normally clothe the two regions of the Northern Hemisphere are of mixed deciduous and coniferous species. The industrial development of those portions of the United States which fall in this tract and of the corresponding parts of Canada is such that they are no longer self-supporting in the matter of food-stuffs.

The same development has not yet taken place in the Asiatic regions; indeed, Manchuria is a tract as yet considerably undeveloped. It is obvious that if such a wonderful result may be attained with this type of climate in America, there are vast possibilities in the future for Manchuria.

The Cold Temperate or Sub-Arctic Regions (Köppen's Dfc).—Stretching across the Northern Hemisphere as a broad belt is a region whose average temperature is low and where the greater part of the somewhat scanty precipitation is in the form of snow. The natural vegetation is everywhere of the evergreen, coniferous forest type. The really distinguishing feature is the shortness of the summer—insufficiently long for the ripening of cereals. Certainly a little oats and barley are grown, but the region is beyond the economic limit for the cultivation of wheat. In most typical stations only one month rises above 60°, and in many cases the annual average is below 40°. In certain parts near the ocean the range of temperature between summer and winter may be comparatively small, but in the heart of northern Asia there is actually a range of over 100° F.—the greatest in the world. A similar type of climate occurs on mountain ranges throughout Europe and North America. In the Southern Hemisphere only the extreme south of South America and the mountains of New Zealand have a climate sufficiently cold to belong to this type. Where agriculture is so little favoured, natural vegetation remains important. The peculiar structure of the thick-skinned resinous leaves affords adequate protection both against cold and excessive loss of moisture. The finest tree growth is in the warmer southern parts; northwards the trees become scattered and smaller or grow but slowly. Thus it takes fifty or sixty years for timber forests to regenerate in the southern margins, but up to two hundred years in the poleward tracts. The Coniferous Forests, or Taïga, are the world's great storehouse of soft-wood timber, such as pine, fir, and deal. The great belt of forest stretching across North America is the most important in the world; in Europe there are the forests of Scandinavia and northern Russia, whilst the same type reappears in the hills and mountains of north-western and central Europe. Across the north of Asia, that is in Siberia, the forested areas are largely inaccessible and suffer from the peculiar physical conditions of the land. The great rivers there flow northwards towards the frozen Arctic Ocean, and are themselves frozen throughout the winter. In the spring the upper courses in the warm south melt, whilst the central and lower courses are still ice-bound, with the result that flood-waters spread far and wide over the flat country and turn the 'Taïga' into a vast forested morass. This is reflected in the poor condition of much of the timber.

The sparsely inhabited and less accessible regions of the Coniferous Forests are occupied mainly, before development, by hunters

and trappers, for the animals of the northern forests are protected from the cold by thick fur. The main fur-producing tracts are round Hudson Bay in Canada, and in the forest regions of Siberia. In the economy of a civilised world, logging and timber working industries take first place in these tracts, the production of wood-pulp for paper being not the least important of the uses of coniferous wood. The trees are felled during the winter, dragged over the slippery snow to the water-courses, and floated down the rivers when the snows melt. Accessibility, the presence of streams suitable for floating, and the existence of water-power for saw-mills and pulping-mills are the factors influencing development. By far the most important areas are along the southern fringes of the forest in eastern Canada and in the countries of northern Europe. The influence of the abundance of easily worked wood is seen in the dwellings in the forested regions, from the rough log cabins of the Canadian backwoodsmen, the timber-workers of Finland and northern Russia, to the elaborate wooden chalets of the Swiss mountain forests.

The softwood forests of the smaller countries of Europe have been worked so long that it is difficult to maintain an output of timber and wood-pulp, and certainly almost impossible to increase that output. The only two countries in the world which still have very large reserves of softwood are Canada and Russia.

The Cold Desert or Tundra Regions (Köppen's E and F).—Within the Arctic Circle the winters are very long and very cold—there are at least some days on which the sun never appears—whilst the summers are very short though warm. Though for certain periods the sun never sets, it never rises far above the horizon. It is too cold for forest; the natural vegetation is moss and lichen, with stunted bushes and small trees near the forest limit. Agriculture is practically impossible, for the ground is frozen for three-quarters of the year. The short, hot summer does, however, sometimes produce an amazingly prolific growth of grass and herbs, which can take advantage of the continuous sunshine of mid-summer; hence the introduction of the name 'Arctic Prairies,' substituted in Canada for the old term 'Barren Lands,' which scarcely does justice to the region.

Though they are at present almost uninhabited, there seem to be future possibilities for the development of these lands, by the breeding of reindeer or caribou, the natural animal inhabitants, whose flesh and skins have a very definite economic value. Remarkable developments have taken place in Arctic Siberia under the Second Five Year Plan (1933–37) and the Russians have now established several towns and numerous research stations.

Northwards the Tundra lands pass into regions of permanent ice and snow, the plateau of Greenland representing the ultimate

development of the extreme type of Cold Desert climate. To this the Antarctic Continent corresponds in the Southern Hemisphere.

IV. Highland Regions

In ascending a mountain in the tropics we may be said to pass through, in a very broad and general sense, the main vegetation regions as from the equator polewards. Thus the tropical forests and grasslands give place upwards, very frequently, to a belt of hardwood trees, then to a belt of conifers above which come the alpine pastures which are the counterpart of the arctic pastures just described. There are other differences which are due to the effect of elevation and the consequent rarefaction of the atmosphere. From the point of view of commercial geography it is important to remember that, in a mountainous country, a wider variety of products can be grown than might otherwise be possible ; thus on plateau regions in the Tropics it is possible to cultivate crops which are otherwise only grown in temperate latitudes. It is possible too, as, for example, on the plateau of Kenya, for white settlement to take place in a region which would otherwise only be suitable for tropical agriculture.

From the causes indicated population in most parts of the tropics is relatively scanty, and commercial products, such as coffee and sugar, are mainly grown under the direction of Europeans, or people of European origin (as in India and Ceylon, Java, Brazil, and West Africa). Many of them are products of hill slopes at a greater or less elevation, such sites presenting combinations of soil and climate not to be found elsewhere. While the temperature is more moderate than on the low grounds, it has all the uniformity characteristic of the tropics, and the slopes of tropical mountains exposed to warm ocean winds enjoy frequent and copious supplies of rain, combined with the advantage of excellent drainage, so that there is little fear of the roots of crops or trees suffering from excess of moisture. The only danger to be guarded against is the possibility of the soil being washed away from the roots at the same time.

To Europeans the residence on tropical hills is perhaps more healthy than residence on the low grounds in the same latitudes ; but even at the elevation at which coffee is grown, a tropical climate is for them neither entirely healthy nor agreeable. The enervating effects of the heat and moisture render them unfit for work such as they could engage in with comfort in more temperate regions ; and notwithstanding the uniformity of the temperature as indicated by the thermometer, the unpleasant sense of heat often alternates with as unpleasant a sense of cold, for the excessive moisture of the atmos-

phere renders one sensitive to variations of temperature which would be scarcely felt in a drier climate. Humboldt mentions in one place that he and his companions, after a short residence in the torrid zone, found that their senses had become so easily affected by the slightest change of temperature that they could not sleep for the cold on one occasion, even when they discovered, to their astonishment, that the thermometer indicated a temperature equal to 71° Fahr. The writer has had similar experiences in Burma and elsewhere, after residence in Rangoon with average temperatures of 80°, night temperatures of 50° in the hills produced the feeling of intense and penetrating cold. An African traveller mentions that on the Senegal one could not expose oneself in the open air after sunset to a slight lowering of temperature without feeling the sensation of decided cold. In central Africa, within ten degrees of the equator, the natives keep themselves warm at night by spreading the mats that form their bedding on hollow clay benches heated by fires or glowing charcoal inside, just as is done in China.

In the temperate zones not only is the temperature on the whole lower than within the tropics, but the variations in temperature are generally greater. As far as the more productive parts of the earth are concerned, it is chiefly in the temperate zones that frosts occur, and water-vapour is precipitated as snow. A snow-covering of longer or shorter duration is a regular annual occurrence in higher latitudes (from about 40° or 46° N., according to the locality), except in those western tracts which are most directly exposed to the warm winds from the south-west. The deepest snows in cultivated regions are those which occur in the eastern provinces of Canada, where snow lies on the ground to a depth of from 3 to 5 feet. Both snow and frost may be regarded, on the one hand, as interruptions to field labour. Frost is also an interruption to communication by closing navigable rivers, and snow by blocking railways and roads. On the other hand, snow favours timber transport and sledge-travelling, and aeroplanes fitted with skis have overcome some of the difficulties of winter travel. To the native tribes of northern Siberia the aeroplane is a commonplace, though they have never seen a motor-car. In regions of scanty rainfall snow is in many parts of the world extremely important as a natural store of moisture for summer use, especially on mountain slopes, and all the more if forests are present to prevent its removal by gravitation. Elsewhere this store may result in injury by flood. Both snow and frost, moreover, must be recognised as beneficial to the soil, and hence favourable to cultivation. Snow, from being a bad conductor of heat (owing to the large proportion of occluded air), though it tends to preserve rigorous temperatures in the air above, protects the underlying soil against these rigours, and, when the time of melting arrives, saturates the ground with moisture, which brings vegetation

rapidly forward. Frost, again, by expanding the water in freezing in every pore of the soil to which it reaches, pulverises the soil to an extreme degree of fineness, and thus enables the coming vegetation to send its rootlets to a great depth, and obtain in consequence all the greater nourishment.

Whether in the tropics or the temperate zone, physical exertion at a high altitude has an injurious influence, though the effect is different in different individuals. What is known as **mountain sickness** affects all who are subjected to hard muscular work above 10,000 feet. On the Oroya railway the time during which riveters were engaged did not average a week each. Many returned on the next train. Animals suffer in the same way. The cause appears to be a diminution in the supply of oxygen, bringing about an increase in the relative pressure of the carbon dioxide in the lungs, and thus a stimulation of the respiratory system. That may, on the other hand, be also the explanation of the favourable influence experienced by some at lower altitudes. Immigrants in Alberta at altitudes between 3,000 and 4,000 feet experience a stimulating effect of that region on their appetites as compared with their original British homes. These beneficial influences are readily explicable by a quickened respiratory action in the case of those whose hearts have the necessary vigour. On the other hand, immigrant settlers on the African plateau at similar heights sometimes find the need of spending holidays at lower elevations.

In connection with the subject of climate may be considered underground water-circulation and underground temperatures, inasmuch as both of these depend more or less upon climate, and both have to be regarded in some cases as influencing man directly or indirectly in the same way as climatic conditions. Everywhere at a greater or less depth water is present, saturating loose earth to the exclusion of air. The upper surface of this water-saturated layer, the level of which is indicated by the surface of water in wells, is known as the water-table, and its depth below the surface is determined by the amount and mode of precipitation and the rate of evaporation. The amount of water that penetrates to a sufficient depth to feed this layer varies according as the precipitation is in the form of fine or heavy rain, or of snow or hail, and according as the melting of snow or hail takes place when the ground underneath is frozen or not. The circulation of this underground water depends on the porosity of the rock and the slope of the water-bearing strata, which may differ greatly from the surface slope. It is from this underground water that springs are derived. In many places matters dissolved in the upper layers of soil are carried down a short depth and being redeposited, cause the formation of a hard

layer known as hard-pan, which the roots of plants do not penetrate at all or only with difficulty. Where the soil lies horizontally this hard-pan may form vast underground sheets, such as those known in the Landes of south-western France as *alios*, in the plains of northern Germany as *ortstein*.

Surface temperatures penetrate only to a slight depth. Daily variations in temperature cease to be observable at a depth of about three feet, and even the yearly variations are perceptible at most to a depth of 80 to 100 feet. The depth at which they can be detected is least in the tropics, about twenty feet, where the annual range of the surface temperatures is least, and greatest in the interior of the continents, where the corresponding range is widest. Below the level of this layer of constant temperature the temperature underground steadily increases at a rate that varies somewhat with different circumstances, among which the conductivity of the rocks is prominent, but is calculated to be on the average at about 1° F. for every 60 feet depth. This is the cause of the variation in the temperature of spring water, that coming from the greatest depth having the highest temperature, and generally, therefore, the greatest abundance and variety of mineral content. Most medicinal springs are hot springs. The result of the small depth of the layer of constant temperature in the tropics is that spring water there is never refreshingly cool but always at temperatures of from 68° to 72° F. On the other hand, in Iceland, where there are low equable temperatures and there is consequently a layer of constant temperature near the freezing-point close to the surface, the spring waters are so cold that instead of being allowed to irrigate the fields they have to be carefully led away from them, as their effect would be disastrous. The increase of temperature with depth below the surface has a great effect in mining operations and in tunnelling under high mountains. Men cannot work for any considerable time in dry air when the temperature is above 120° F., or in moist air when it is above 105° F., or even less. Now at Edinburgh a temperature of 105° might be expected at a depth of less than 3,500 feet, one of 120° at about 4,350 feet. This latter depth is one that is commonly attained by many mine workings, and there are mines over 7,600 feet in depth in South Africa, but it is only by the most careful ventilation that the working of such mines is practicable and a high mortality prevented. In the moist air of the Alpine tunnels great difficulty was met with in carrying on the work even at temperatures of 90° F., and the piercing of the Simplon tunnel would have been impracticable but for the cooling due to the expansion of the compressed air which was used to drive the boring tools.

II. THE SOIL AND ITS TREATMENT

The soil exercises an influence on vegetation in various ways. In the first place, it supplies a portion of the food of plants. It supplies also substances which may not be themselves converted to any great extent into vegetable tissue, but which serve to carry about the food-stuffs from one part of the plant to another, or to effect the necessary changes on these food-stuffs, from whatever source they may be derived. And, thirdly, the nature of the soil affects the life of the plant by the effect it has upon the temperature of the roots, or other parts of the plant embedded in the ground ; for some soils are more readily heated than others, and more readily give up their heat to bodies in contact with them.

Soils differ from one another in two classes of characters, physical and chemical, both of which are of importance to the vegetation belonging to them. Physically, soils differ from one another in the condition of their particles. They may be coarse or fine, porous or compact and tenacious. Other things being equal, the fine—loam or silt—soils are more fertile—that is, supply food more plentifully to the vegetation living upon them—than the coarse : for all the food which plants derive from the soil enters the small rootlets dissolved in moisture, and the finer the earthy particles the more easily are the necessary substances dissolved. This is one reason why the soil of deltas is almost invariably remarkable for its fertility, for such soils are made up of the finer sediment carried along by a river. The advantages or disadvantages of porous soils as compared with those which are compact and tenacious vary according to circumstances. One advantage porous soils nearly always have—that of being light and easily worked by the plough or spade. They are also easily permeated by water, and thus readily permit rain to sink into them, instead of running in great part off the surface, and at the same time favour the rise of moisture from great depths, by the action of capillarity (the action by which liquid diffuses itself through a lump of sugar). But this may be an advantage for certain plants or in certain climates, and a disadvantage for other plants and in other climates. It is a disadvantage to plants that require the retention of a great deal of moisture about their roots ; and while it may be, and generally is, an advantage in climates in which showers are frequent and the atmosphere moist during the growing season, it is a disadvantage in climates of an opposite character, where it is of importance for the plant life that the moisture in the soil should be long retained within reach of the roots—that is, that it should neither sink away to a great depth, nor rise up too rapidly and quickly evaporate, thus giving the plants the benefit of the moisture for only a short time.

In moist climates porous soils are generally, in virtue of the

superior dryness of their superficial layers, more easily warmed than heavy and compact soils, and that not only because water requires a greater amount of heat to raise its temperature to a certain degree than any solid substance, but because of the loss of heat by evaporation. Hence light porous soils are generally described as dry and warm, and those of the opposite kind, like clays, as wet and cold. Soils may be so compact as to prevent the access of air to the roots and hence infertile from that cause.

So great are the natural differences in respect of chemical composition that, to take wheat as an illustration, the soil of one region may yield a crop of 50 or even 70 bushels to the acre, whereas that of another yields, with a climate equally favourable, no more than 12 or 15 bushels, or perhaps even less. The composition of the soil often varies very greatly from local causes within limited areas; but there are, on the other hand, many wide regions noted for being covered with a soil either characteristically rich or characteristically poor. Everywhere, it ought to be mentioned, the soil is due to the crumbling away of solid rock under atmospheric weathering (which varies according to the climate) more or less modified by the vegetable, and even the animal, life that comes to occupy it. Large deltas are generally remarkable for their fertility, not only, as above indicated, in consequence of their physical nature, but also because they contain ingredients derived from the whole basin of the river by which they are formed, and hence are likely to contain all the constituents which a variety of plants require as food. For a similar reason, great alluvial plains like those of the Ganges and the Po are generally remarkable for their fertility, and so also are the beds of former lakes, such as the basin of the Red River of the North, in the United States and Canada.

Organic matter, or humus, the product of decay of vegetable matter, mixed with earthy (mineral) constituents, renders a soil of great fertility, rich in plant food. A moist soil, however, hinders the intermixture of the vegetable remains with the earthy particles and causes the formation of what is called acid humus, of which peaty soils are the most familiar example. The moisture of such soils is not readily taken in by the plant tissues, and hence those soils are adapted only to a special kind of vegetation of a dry woody habit like heaths. In some places humus is formed very abundantly in tropical forests, where vegetation is continuous and the accumulation of vegetable waste proportionately rapid. But it is not readily formed in all tropical forests. If the climate has long dry spells and the forests are rather open, the falling leaves dry up, get hard and crisp, and are easily broken by the wind, so that their elements are dispersed in the form of gases. To this cause is ascribed, in a great measure, the infertility of a large part of Brazil. Where there is a regular winter accumulation of snow,

this covering has, among other important effects, that of burying the fallen vegetable matter and saturating it with moisture so as to favour the formation of vegetable mould. The action of earthworms in promoting the formation of a soil rich in this ingredient, by covering the surface deposits with layers of earth brought up from beneath, has been made a matter of almost universal knowledge by the well-known work of Darwin.[1]

Many lavas or rocks originally poured out from the interior of the earth in a liquid state decompose into a soil of exceeding richness. Soils of this kind form some of the most fertile tracts, not only in Java and Japan, Campania and eastern Sicily, and other regions where there are volcanoes still active, but in many other regions where there have been no volcanoes within historic times. Among the latter are soils covering considerable areas in Hungary, and the much more extensive tract which forms a large part of the wheat-growing area of Oregon and Washington in the United States, the tract occupying both sides of the Columbia River, where the soil results from the decomposition of a broad basaltic plateau, and the coffee soils of Sao Paulo in southern Brazil, due to the disintegration of diabase rocks rich in potash and other fertilising ingredients. In some cases, so rapid is the decomposition of lava, that some of the vineyards on the slopes of Mount Vesuvius occupy lava fields which came into existence within the nineteenth century.

Among other soils noted for their fertility occupying extensive areas in different parts of the world may be mentioned the black soil (chernozem or black-earth) of southern Russia and central Asia, the yellow loessic soil of northern China, and the black cotton-soil of the Indian plateau, which last differs from all the others previously mentioned in being very stiff and heavy, and owes a large part of its fertility to its being so peculiarly suited to the character of the climate where it is found in that it is very retentive of moisture.

The soils known as laterites, from being of a colour and having a porous nature like red bricks (Lat. *later*, a brick), are characteristic of tropical and sub-tropical climates, being due to the rapid decomposition of the rocks under the influence of rapid

[1] It is singular that the anticipation of Darwin's observation in a book so popular as Gilbert White's *Natural History of Selborne* should, apparently, be so little known, and that Darwin himself should have forgotten White's remark. The passage referred to occurs in Let. LXXVII (edn. of Capt. T. Brown, 1833 ; Let. XXXV in the edn. of E. T. Bennett, revised by J. E. Harting, 1875), where we read :—' Earthworms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For . . . worms seem to be the great promoters of vegetation . . . by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves into it ; and, most of all, by throwing up such infinite numbers of lumps of earth, called worm-casts, which, being their excrement, is a fine manure for grain and grass.'

changes in temperature, and the alteration of wet and dry seasons. They owe their red colour to the presence of iron, and when fully formed iron and alumina remain as the chief constituents. The lime, potash, and magnesia which may have been contained in the rocks from which they are formed all disappear, and in the high temperatures of the tropics even the silica gets dissolved and washed away, frequently being redeposited as a cementing substance in underlying sands. When the process is thus carried out to its full extent such soils are almost worthless, but this takes place only in exposed situations where the rainfall is very high. But the term laterite is freely applied to many red earths in which the solvent action has not gone so far, and which, accordingly, vary in their properties, some being fertile, others not. If the term is applied generally to the red earths of the tropics, then laterites have been estimated to cover 49 per cent. of the area of Africa, 43 per cent. of that of South America, and 18 per cent. of that of Asia. But this estimate includes under the head of laterites the red soil which is found to be particularly favourable to the coffee-tree on the slopes of the mountains of eastern Brazil, south of Rio de Janeiro. In many parts of Africa the infertility which characterises this soil is due rather to its physical than its chemical characters. The solution of the silica has proceeded only so far as to coat the particles of earth with a thin glaze, giving rise to a soil so porous that the rain runs through it very readily, and as such soil is found in that continent over wide areas to a great depth, in those parts the soil dries up with remarkable rapidity, unless refreshed with frequent showers.

The soil of arid regions is in many cases chemically very rich, so that when water is supplied the ground is exceptionally productive. For this there are two reasons. The soil is largely wind-borne and is hence collected from wide areas, and for that reason is likely, as already stated, to possess a great variety of ingredients. Second, such vegetation as does grow naturally in those regions produces an exceptional growth of underground parts, and those parts of a plant are always richest in nitrogen. Hence, though the soil from the scantiness of the vegetation may be comparatively poor in humus, its nitrogen content is not correspondingly feeble, and may be considerably in excess of that found in humid areas.

In the arid or drier parts of the earth the soil is frequently highly infertile, and even poisonous to vegetation, from the excess of salts found on the surface, due to the fact that the moisture which does penetrate beneath the ground dissolves the salts in the earth, and then, rising up again and evaporating, leaves the salts as an incrustation behind. Vast areas of this description are found in the interior of Asia and south-eastern Europe, of Australia and South America, while smaller tracts of the same nature exist here and there as patches

amongst the fertile regions of California and the Canadian Prairies, where they are known as 'alkali spots.' The formation of such salt incrustations is one of the risks attending irrigation.

It will be clear from the above account that soils depend very largely on climatic conditions; indeed, the great soil groups of the world correspond largely with the great climatic regions. This generalisation was first generally appreciated in Russia by Glinka and the many soil scientists or pedologists who followed him. Within a major soil group local variations may depend largely or mainly on the characters of the underlying rocks. This is notably the case in a cool, moist climate such as Britain where many of the soils are 'aclimatic.' Soil science has made much progress in recent years and one method of study widely followed is that of the 'soil profile.' Many soils, traced from the surface downwards, exhibit a surface horizon of 'leaching' (the A horizon), a lower horizon of secondary enrichment (the B horizon), and a lowest horizon of slightly altered parent rock (the C horizon). These three horizons are particularly well seen in the ash-grey soils or podsols of northern latitudes—soils of the northern coniferous forests, often lacking in fertility owing to the extensive leaching from the surface layers.

Preservation of the Properties of the Soil.—But however rich a soil may be by nature, sooner or later its fertility will be impaired by cultivation unless means are taken to prevent this deterioration. The substances that serve as the food of one crop are removed when that crop is carried away and consumed elsewhere, and as the same kind of plant always requires the same kind of food, the fertility of a soil is in general reduced very rapidly when the same crop is grown repeatedly on the same land, and when nothing is done to restore the ingredients that are thus removed. Under a careful system of cultivation two plans are adopted to counteract this tendency of the soil to lose its fertility. One is to vary the crops that are cultivated in succession on the same piece of ground, which spares the land in two ways. First, since different plants withdraw from the soil different substances as food, or at least varying proportions of the same substances, a crop requiring chiefly one kind of food is made to follow a crop which requires chiefly another kind. Secondly, it is not always necessary to remove from the ground the whole of the cultivated plant, and the parts of the plant not required may be returned to the ground, and help to restore to it some of the ingredients required not only by this crop but by crops of other kinds.

Obviously, however, this method is an imperfect one, and the only way to maintain permanently the fertility of the soil is to restore by fertilisers the ingredients that are withdrawn by successive crops. But here it must be noted that the quantity of matter that has thus

to be returned to the ground is small in comparison with that which is carried away as produce of the soil, even though the plant-food contained in the manure is generally a small proportion of the bulk of the manure itself. It has been found by experiments made in England in the cultivation of wheat that the use of 200 lbs. of a particular kind of manure made a difference of nearly 600 lbs. in the weight of grain yielded by an acre of land, as compared with a piece of land, of the same extent and the same natural qualities of soil, that had borne wheat without manure nine times in succession; and this difference, it will be observed, does not take into account the weight of straw and other parts of the crop. The reason of this is, that though all plants derive some of their nourishment from the soil, and the amount of their produce is generally more or less governed by the amount of nourishment obtainable from that source, yet in all cases the chief constituents of plant-food are derived from either air or water.

Small as the total proportion of plant-food derived from the soil is, the constituents of such food are very varied; but the three essentials to plant-growth most likely to be lacking in cultivated soils are nitrogen, phosphoric acid, and potash, and hence manures containing these substances are most important as articles of commerce. All three are contained in animal excrements and in animal refuse of various kinds, and these, accordingly, are generally the most convenient manures to apply to the ground where mixed farming, part crop-growing and part cattle-feeding, is carried on. It had long been known that leguminous crops such as clover, lucerne, beans, peas, and lentils not merely required no nitrogenous manures but even served to replenish the soil with soluble nitrogen for subsequent crops, but an important stimulus to the cultivation of such crops for use as green manure was given by the discovery in the eighties of last century that this was due to the fact that bacteria present in nodules on their roots and rootlets served as the means of fixing nitrogen derived from the air. The name of commercial fertilisers is given to various compounds, nitrates, phosphates, and potassic salts, or mixtures of these, artificially prepared, containing the above-mentioned ingredients along with others, as well as to natural compounds which are found in deposits of greater or less abundance in various parts of the earth, and are worked as minerals, though originally they may be to a large extent of vegetable or animal origin. These enter into world trade to the amount of millions of tons annually—indeed between 1903 and 1913 the world's demand for nitrogen compounds increased from about two to about five million tons. This is exclusive of the still larger quantities at least of nitrogen and phosphorous compounds that become available after first being employed as feeding stuffs.

Of the artificial fertilisers, the bones of animals variously treated

have long been used. Being to a large extent composed of phosphate of lime, they are of great value as manure, not only on account of the phosphoric acid which they contain, but also on account of the nitrogen always present, and also because of the lime itself: for though this latter substance is not so important as phosphoric acid as a plant-food, it is often of the highest importance as a manure from the fact that, by bringing about certain chemical changes, it helps to make the constituents of plant-food which are present in the soil available to the vegetation. For, seeing that, as already stated, all the elements which a plant derives from the soil enter the rootlets in a state of solution, no constituent of plant-food is of any use to the plant unless it be first dissolved; and among other uses which lime has as a fertiliser this is one of the most important, that it is one of the best materials that can be employed for neutralising the acidity of the soil and rendering available substances which the plant would otherwise be unable to withdraw from the soil. For use as manure bones are in some cases merely ground into a coarse meal, in other cases steamed so as to remove most of the nitrogen but to leave a high proportion of phosphorus, and in other cases treated for the same purpose with sulphuric acid so as to produce what are known commercially as superphosphates, although in this branch of manufacture mineral phosphates are mainly used. Since 1886 a fine meal or flour obtained by grinding basic slag, which contains from 30 to 35 per cent. of phosphate of lime, has become more and more used as a phosphatic manure. For many years there was an enormous trade in the export of Chilean nitrate (sodium nitrate) from the desert regions of northern Chile. The mineral phosphate (guano) derived from the droppings of birds is a product of many tropical islands and mineral phosphates are mined elsewhere. All these mineral fertilisers have severe competitors in the artificial fertilisers produced by the factory. Thus sulphate of ammonia forms a valuable nitrogenous manure, and since the early part of the present century various nitrogen compounds have been made from the air for the same purpose mainly with the help of the intense heat of the electric furnace.

Notwithstanding the manifest advantages of the adequate use of manure in maintaining the value of the soil, its employment in sufficient quantity to ensure the preservation of a high degree of fertility is far from being general. Manure is, as a rule, but little used, first, where the population is sparse, and, secondly, where the population is poor. Where the population is sparse land is cheap, and the cultivator may find, and usually does find, it more profitable, at least at first, to derive as large crops as he can from the ground without manure, and begin to cultivate new ground when the first shows signs of being exhausted. Moreover, where the population

is scanty, there are for obvious reasons fewer opportunities of obtaining animal manure, which in regions possessing a dense population is the kind most readily available. In the United States, accordingly, what we find is that the use of manure has gradually spread westwards, following in the wake of cultivation. The eastern states, which were those first cultivated, were in the beginning cultivated without manure, and as these lands became partly exhausted, others farther west became the chief regions of agricultural production ; but at the same time, as the population, from the development of commerce and industry, thickened in the eastern states, the use of manure to restore fertility to the fields of that region became more and more general. About 1883 the use of manure was stated to have reached the longitude of Ohio, and to be beginning in Indiana, and even in Illinois. Even at the close of the nineteenth century not one acre in fifty was directly fertilised for wheat in the United States.

In India, again, though the population is dense, manure is still little used ; but the principal reason of this is that the employment of manure, besides always involving a certain amount of expense, does not yield its full benefit in the way of increased produce in one or two crops. However necessary it may be, therefore, to maintain the fertility of the land, costly manures cannot be used where the cultivators are too poor, as most of those of India are, to be able to wait and look forward to future years for the reward of an outlay on their farms. Owing to the poverty of the peasant farmers and the scarcity of firewood the cow dung which should be returned to the land is made into cakes and burnt. Thus the Indian farmers are obliged by necessity to content themselves with the small returns of unmanured ground. It is the great prerogative of man 'to look before and after' ; and in agriculture, as in other pursuits, the condition of continued prosperity is to provide in the present for the wants of a somewhat distant future ; and, while increasing wealth will probably result from the exercise of this foresight, the penalty of inability to do this is almost sure to be increasing poverty.

In any case, the cultivation of the soil, without taking means to restore the fertility which continued cropping more or less impairs, is a mode of procedure that can only be of temporary advantage to any country and cannot be of advantage at all unless it leads to the accumulation of wealth, which will render possible the restoration of fertility to the soil when exhaustive cultivation can no longer be pursued. Cultivation on the system originally practised in America, involving the use of a greater and greater extent of land to increase the production, is known as extensive cultivation, as opposed to the system of intensive cultivation, which consists in putting more into the land to get more out of it ; and the furtherance of the latter system—that is, the increasing use of manure—is always

a sign of advancing agriculture and industry in general. The great productiveness of wheat in the countries of western Europe is due to the practice of this system.

Reference has already been made incidentally to the loss of soil where the crops are grown on hill slopes. But such loss is apt to occur wherever there is sloping ground, and especially where the crop does not cover the soils completely. Where grasses, including the ordinary European cereals, are grown the loss from this cause is not rapid, and may be made good by the natural formation of new soil ; but it is otherwise with such crops as maize, tobacco, &c., which have considerable intervals between the individual plants. All the more serious is this loss if the climate is arid and the soil loose and powdery. In recent years this soil erosion has become one of the greatest problems of the United States. Great tracts of once fertile land have been robbed of their soil by dust storms ; the rapid run off of rainwater unhindered by vegetation has, at the same time, resulted in disastrous floods. The Soil Erosion Service of the Federal Government is experimenting with preventive measures such as forming with the plough long mounds, known as magnum terraces, at right angles to the direction of slope so as to arrest the flow of soil-bearing water. The most effective preventive seems to be the grassing of exposed slopes. In general, in all parts of the world, the tendency is for the higher parts of ground to become impoverished from the depletion of soil and the removal of fertilising constituents. The lower parts are, it is true, correspondingly enriched where there is no tendency to an excess of moisture. The most productive parts of sloping ground are for the most part those just above the lowest level—one reason for the prevalence of agricultural villages at the base of hills.

Irrigation.—As manure is the means of correcting deficiencies in the soil, whether these be original or the result of exhaustion, so irrigation is the means of remedying one of the great defects of climate in many regions, the deficiency of rain. The ease with which this remedy can be applied varies greatly according to circumstances. Nowhere is it easier than on the land adjoining those rivers which regularly overflow their banks, like the Nile, the Tigris, and Euphrates or, in past times, the Ganges. In such cases, all that is necessary is to provide canals and sluices by means of which the flow of water over the surface of the land may be to some extent regulated ; and it is likewise a fact of the highest importance that the irrigation of land so situated is not only exceptionally easy, but also of exceptional value. For a river when highest in flood is always most highly charged with fertilising sediment ; and so rich is this in the valley of the Nile, for example, that wherever 'red water' can be supplied there is no need for manure. Formerly in the Ganges valley, again, embankments were in few places required to restrain

its inundations, for the alluvial silt which it spilled over its banks year by year afforded to the fields a top-dressing of inexhaustible fertility. If one crop be drowned by the flood, the cultivator calculated that his second crop would abundantly requite him. But the most urgent need of water is in those dry seasons when the river floods are deficient, and the policy in India for many years has been the replacement of inundation canals by perennial canals. There are now scarcely any of the old type left. The usual system now, in India as elsewhere, is to build a dam across the river often in an upper part of its course and then to lead canals from the artificial lake so created. Branch canals lead from these and then distributaries, all controlled, conduct the water to the fields. Spare water seeps back gradually into the river course.

In other cases, various more or less costly methods have to be employed to render water available. Water may be raised by buckets from wells or rivers. Large tanks (these may be of concrete, as on the banana plantations of the Canary Islands, and should not be confused with the so-called tanks of India which are small lakes made by damming a stream) may be constructed to store the superfluous waters of one season or period against the deficiencies of another.

In some places the structure of the country is such that when holes are dug in the ground to a certain depth water rises freely to the surface often with great force. Wells so made are called **artesian wells.** Such wells have been sunk in many regions where the rainfall is deficient. Large areas, as of Australia, formerly wholly or nearly barren, have been made more highly productive. Usually, however, artesian water is too highly charged with mineral salts to be suitable for irrigation but is excellent for watering stock.

Irrigation water can be much more profitably used in agriculture than an equal quantity of rain. It can be preserved in tanks till the exact period at which it is needed. It is thus kept from sinking into the ground to a great depth, and so becoming lost to vegetation, as happens to much of the rain that falls upon the earth where the soil is highly porous. At the same time it suffers infinitely less loss than generally diffused moisture through evaporation—a matter of peculiar importance in those bright and warm regions where irrigation is specially required. For crops of great value it is even sometimes found of advantage to distribute the water to the fields entirely by underground pipes. By the adoption of this method evaporation is almost wholly prevented. It is often difficult to teach the peasant cultivator in arid regions that too much moisture can be injurious to his crops : there is actually an optimum quantity which if exceeded results not only in waste of precious water but also in a decrease in production.

It will thus be seen that though irrigation is almost always a costly process, the advantages derived from it are correspondingly great. They are chiefly these: (1) The supply of water by irrigation is more certain and regular than that by rain even in regions where the rainfall is generally plentiful, and that of itself increases the productiveness of irrigated crops. (2) Irrigation water is frequently more or less rich in fertilising ingredients according to circumstances. In India it is found that as a general rule irrigation doubles the weight of crops off the same land. (3) Irrigation by flooding is sometimes of service in washing away noxious constituents from the soil. (4) Irrigation often enables valuable crops to be grown in place of inferior ones. (5) It renders cultivation possible in some cases during the whole period of the year for which the temperature is sufficient in the irrigated region. Thus, in the southern part of California, as well as in Western Arizona, crops may be started at whatever season suits the convenience of the grower, except two months in the year, and this holds true for market-gardens as far north as San Francisco. In some areas five cuts of alfalfa may be taken off the same field in a single season. In Algeria three crops of potatoes may be grown in succession in one season on irrigated land. Hence it naturally follows that the density of population in irrigated regions often reaches a very high point, even when the bulk of the population depends upon agriculture. In the irrigated portion of the Spanish province of Murcia, for example, the density is nearly 1,700 to the square mile, as compared with 125 per square mile for the average of Spain generally.

It is one of the chief advantages of terrace cultivation—that is, the cutting of hill slopes into terraced fields rising step-like above one another—that fields so made are irrigated with great facility. This mode of laying out fields is hence largely practised in the warmer parts of the world, and in some cases a marvellous amount of labour is expended on their original formation. Describing the ascent from Hodeida to Sana in Yemen, Major-General Haig wrote as follows: 'The whole mountain side, for a height of 6,000 feet, was terraced from top to bottom. The crops had all been removed; only some lines of coffee trees here and there were to be seen, but everywhere above, below, and all around, these endless flights of terrace walls met the eye. One can hardly conceive the enormous amount of labour, toil, and perseverance which these represent. The terrace walls are usually from five to eight feet in height, but towards the top of the mountain they are much higher, being sometimes as much as fifteen and eighteen feet. They are built entirely of rough stone laid without mortar. I reckoned on an average that each wall retains a terrace not more than twice its own height in width. So steep, in fact, is the mountain, that the zigzag continues almost the whole way to the top.' Typical of many parts of monsoon

lands in Ceylon, Java, China, and Japan are the irrigated terraces for rice cultivation.

The extension of irrigation works in many of the drier parts of the world—Egypt, Iraq, India, Turkestan, the United States, Canada, Australia, and South Africa—may be noted as a special feature of recent development. But irrigation after all is confined to limited areas, and many arid or semi-arid areas must rely on what is called **dry farming.** By this is meant the treating of the land in such a way as to conserve the moisture which it contains, the essential feature of that treatment being to prepare the surface in the form of a mulch. This term is applied to any covering of the surface that tends to resist the action of capillarity and protect the moist earth underneath against the direct rays of the sun. Even stones spread thickly over the ground may serve as a mulch, and hence it is that in the drier parts of the Mediterranean region stony tracts are regularly sown which in a moist, cool climate like that of the British Isles no one would think of cultivating. In gardening operations mulches are made with leaves, manure, straw, and similar materials, which, though very effective as mulches, have the drawback of preventing the continual stirring of the land and consequently the aeration of the ground underneath. But this continual stirring itself provides an excellent mulch in the form of a dry powdery surface soil, and it is by the frequent use of the plough, harrow, and other implements of tillage that dry farming is generally carried on. In loose light soils this treatment is supplemented by the use of an implement known as the sub-surface packer to consolidate the earth underneath the surface and so retard capillary action. The methods of dry farming have long been known and practised in the drier parts of India, southern Russia, and elsewhere, and have also been widely and eagerly followed in the arid regions of the United States, Canada, and Australia. Of recent years the folly of attempting to farm in some of these arid tracts has been freely demonstrated, and the general tendency has been for the ' pioneer fringe ' to move back. Notwithstanding this the value of dry farming methods is fully appreciated in all regions near the economic margin for farming—notably in South Africa. The danger of wind storms and of sudden rain storms in promoting soil erosion will, however, be immediately apparent.

III. LABOUR AND ITS EFFICIENCY IN THE LOCAL PRODUCTION OF COMMODITIES AND NATURAL FACTORS AFFECTING LABOUR SUPPLY

Labour.—The influence on production of what is usually designated labour varies with the quantity required and the quality available to furnish a given amount of product. In such industries

as coal-mining the quantity required to produce a certain value is high, about two-thirds or more of the total cost. In the case of coal in Britain it has been variously estimated between 64 and 80 per cent. of the pithead cost and this throws much light on the relation between wages and price of coal. Before the War the average cost of labour in finished articles of engineering was estimated at 45 per cent. of the total, in textile products at only 15 per cent. The quality of human labour cannot always be measured. Where it is measurable, it is by the amount of product per head turned out in a given time, whether without the aid of machinery or in association with machinery of the same type; and it is obvious that a high production per head in any region or industry is what renders possible a large surplus of time or labour for employment in other industries or for leisure, which latter use may be itself contributory to a high rate of production in working hours.

Human labour may be broadly divided into slave, or forced, and free labour, the latter being that which is now universally employed in the production of commercial commodities. There are, however, great diversities in the condition even of free labourers in different parts of the world though every year sees a lessening of the divergence. One of the most obvious of these diversities is that of money wages; and it will be observed that the highest wages are those paid in 'new' countries, like the United States and Canada, Australia, Uruguay, and the Argentine Republic. The lowest wages are paid in tropical countries, and in particular in those regions in which there is an exceedingly dense population dependent mainly on agriculture.[1] Wages should never, however, be considered apart from the cost of living.

The highest-paid labour is as a rule also the most efficient, that is, able to produce a greater result within a given time. In 1885 there were for every 100 persons employed in cotton factories in the United Kingdom 8,798 spindles and 111 power-looms; whereas in India, in 1882–83, for the same number of persons employed, there were only 3,085 spindles and 28 power-looms. In an official report published in 1919 [Cmd. 442] on the relative efficiency of Lancashire and Indian operatives in the cotton industry it was stated that the ratio of efficiency is as 2½ to 1. In Cawnpore nine men were still required to work a mule of 800 spindles where, it is said, only three would be necessary in a Lancashire mill. A Lancashire weaver usually minds four looms by himself, whereas in India 50 per cent. of the weavers will only mind one loom. The

[1] Thus in Oudh, one of the most densely peopled territories in British India, the average monthly wage for an able-bodied agricultural labourer in 1901–3 was 3·0 to 3·7 rupees, or about 4*s.* to 4*s.* 11*d.*; in 1916 about 12 rupees. In Burma, the most sparsely peopled province in proportion to its resources, it was 14·1 to 15·1 rupees, or about 18*s.* 9*d.* to 20*s.* 1*d.* (*Imp. Gaz. India*, new ed., iii., p. 472). In Burma the rate had increased to about 30 rupees in 1926.

limit is now placed not so much by the powers of the operatives as by regulations made to prevent their exploitation, either by government or by their own trade unions.

The reason of the difference of efficiency is to be found in various causes. Much is undoubtedly due to difference of race and climate, but much also to difference in food and dwellings and to difference in intelligence, the highest-paid labourers being those who can afford to live in the best houses and eat the most nourishing food. This last consideration has led increasingly to sound social legislation, involving large expenditure, which, however, is probably remunerative. Seeing that all the countries of the world now work more or less for one another, the people of the world generally would benefit by the world-wide spread of such legislation. In other words, what is sometimes considered the unfair advantage accruing to Japan through low labour costs would disappear with an increased standard of living there.

But the condition of the labourer also is very inadequately indicated by the difference in the rate of wages, since the wants of the labourer are very greatly affected by different circumstances, and above all by climate. In a region where the winters are severe, the labourer has to spend more in providing himself with adequate protection against the weather by means of good housing, clothing, and fuel than he has to do in a region where the climate is less severe, without being better off in health and comfort than a labourer in the more favoured region. The food required in a temperate climate, and especially one of the colder temperate countries, moreover, is of a much more expensive kind than that suitable to a tropical or warm temperate climate. Even in Japan, which lies in the same latitude as the east of the Mediterranean, and has a much severer climate, the farm labourers live almost entirely on rice, barley, or wheat, beans, peas, and other vegetable food, in summer wear little more clothing than a cotton garment or two, with straw sandals and wooden clogs for foot wear. It is worthy of being pointed out, however, that those parts of the world in which the highest wages are paid are also those in which many of the most important necessaries of life are cheap. Cheap land ensures relatively cheap food, which may more than make up for the dearness of manufactured articles to the working-man ; and the advantages of high wages is still further increased if the climate is mild, as in Australia.

Even free labour is subject to many restrictions imposed by custom and religion, by government interference, or by the voluntary organisations of the labourers. In all Christian countries custom and religion have established the Sunday as a day of rest ; and though this abstention from ordinary labours on Sunday is probably nowhere rigorously adhered to, it is more generally observed in the

British Isles and the countries of British origin than elsewhere. In Roman Catholic countries, and the countries belonging to the Greek Church, the days devoted to religious festivals take a more prominent place in interrupting the ordinary course of labour than they do in Protestant countries. In Mohammedan countries Friday (even in pre-Mohammedan times a day of rest in Arabia) is specially devoted to religious services, but it is less rigorously observed as a day of rest than the Sunday in Christian lands.

The interference of government with the employment of labour in free countries is in some cases in the form of enactments limiting the number of hours of work to be exacted in a day; in other cases in other modes. The Factory Acts in the United Kingdom professedly limited the working hours in factories only for women and children. The provisions in those Acts that expressly applied to adult male workers were only such as are intended to secure health and safety. Since the outbreak of the War, however, there has been a general limitation of the number of hours' work for men. The employment of the young is now limited in Great Britain under the Education Acts. Under the English Act of 1918 no child under 12 may be employed at all, and no child under 14 (in Scotland under the Act of 1919 no child under 15) may be employed in any factory, workshop, mill or quarry, and no young person under 16 (eventually 18) may, subject to certain exemptions, be employed in any manner incompatible with attendance for a certain number of hours annually at continuation schools. The Employers' Liability Act of 1897 renders employers liable in certain cases for injuries sustained by persons in their employment, whether there may have been any contributory negligence on the part of the injured or not, and in 1906 this liability was extended to nearly all employers. There is similar legislation in many European countries. In Switzerland the limitation of hours expressly applies to men as well as women, and in Germany the Imperial Industrial Code empowered the Imperial government to limit the hours for men and women alike where excessive hours were deemed to be injurious to health. The former German Empire was the pioneer in the insurance of workmen against illness (under an Act of 1883), against accidents (1884), and in providing for old-age pensions, beginning at the age of seventy (1889). In the United Kingdom old-age pensions, beginning at the same age, were introduced in 1908, and in 1911 Acts were passed making insurance against illness generally compulsory, and insurance against unemployment in a few important trades, and in 1920 this latter form of insurance was made to cover all employees except those in agriculture and domestic service. In 1936 it was extended to agriculture. In both cases employers and employees share the greater part of the cost. In the United States labour legislation has been a matter reserved to the individual

states, and in such legislation Massachusetts was often the leader. Under the Roosevelt administration of 1933–37 the Federal government formulated a series of ' codes ' for the major industries.

Trade unions and similar voluntary organisations among labourers impose various restrictions on the labour of their members for the sake of what is believed to be the general interest of the body, the efforts of these organisations being directed mainly to the obtaining of as high wages and as short working hours as are possible in any given state of trade and industry. Such organisations are most highly developed in countries, like the United Kingdom, in which manufacturing industry is most highly advanced ; but unions having similar objects have existed at all times in many countries. Among the labourers of China trade guilds exercise important functions of various kinds. Chinese emigrants have carried the system with them into the lands to which they emigrate. In India the caste system as now developed acts to some extent in the same way. As a trade union each caste ' insists on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, and promotes good fellowship by social gatherings.' (Hunter's ' Gazetteer,' 2nd ed. vi. 197.)

The kind of labour known as **coolie labour** is a form of free labour, but a peculiar one. The labourers known as coolies are emigrants from India and China who bind themselves to work for a term of years (generally five) on plantations in European tropical and subtropical colonies. They are entitled to regular wages while their term lasts, and in some cases to a free passage back to their own country when their term has expired. Contracts for the engagement of coolies in India and China are allowed only under certain regulations, and it was sometimes found necessary, owing to the treatment to which the coolies were subjected, for the government of the country from which they were derived to prohibit such engagements with certain countries altogether. Of recent years indentured labour of this type has become less common.

Somewhat similar contracts are made even with bodies of European labourers, the chief difference being that in their case the work on which they are engaged is not the tending of plantations, but the execution of some great piece of engineering. They were even introduced into the United States, and were very largely employed there in the construction of railways ; but their further introduction was prohibited by an Act of Congress in February 1885, which made the importation and migration of foreigners and aliens under contract illegal. In new countries at an early stage immigrants are generally welcomed, for labour is urgently needed, but a time comes when there is a tendency to restrict immigration, as in the United States and Australia. Another recent tendency is to make arrangements between different countries for land settlement

by families, as of British families in Canada, Italian and German families in different states of South America.

Slave labour in the strict sense of the term is now virtually extinct, and Abyssinia was, until the Italian conquest of 1935–36, its last stronghold. At one time or another, however, slavery has been practised in all countries, and even in Europe down to the nineteenth century. It is only within the last fifty or sixty years that the system was put an end to in the tropical colonies of European countries, Great Britain having set the example in 1833 by passing an Act for the emancipation of the slaves throughout the British dominions. So far as the production of commercial commodities was concerned, the immediate effect of the abolition of slavery was in many cases disastrous. The freed negroes (for people of African origin formed the slaves in all parts of America) preferred, wherever plenty of land could be had, to live the life of the peasant subsistence farmer, instead of working for wages, however high, on plantations. The consequence was that in Jamaica, for example, the annual value of the exports fell from an average of nearly three millions sterling during the period 1832–36 to less than two millions in the period 1842–46. In densely peopled islands like Barbados, where the negroes when liberated were obliged to work in order to gain a living, the effect was not so bad. In other parts of America in which slavery has been abolished subsequently, the effects have varied similarly according to circumstances, being little marked in respect of the quantity of production, at least where there were facilities for replacing slave by free labour, and especially by the labour of white men. In parts of Brazil, for instance, the change from slave to free labour was eagerly welcomed by the entire body of the inhabitants, inasmuch as the work was done 'better, quicker, and with more care' by free men than by slaves, so that the benefit of emancipation was at once realised.

There are other forms of forced labour besides that maintained by the system of slavery. The system of serfage, according to which individuals with separate rights and separate property were yet attached to particular estates for the owners of which they were compelled to work, and were usually sold with the estates, subsisted in Russia till 1861 ; and forced labour for certain purposes was up till much later exacted by the Dutch government in the East Indies, and by the government of Egypt. In Latin America multitudes of the population are kept in virtual slavery by the system of peonage, by which the poorer people are encouraged to contract debts to their employers, and care is taken to prevent them from obtaining release from those debts. It is one of the most difficult tasks of the British administration in India to protect the peasantry against similar abuses on the part of money-lenders.

Machinery.—The nature of the change that has been made in

the conditions of production in manufacturing industry through the introduction of machinery is sufficiently illustrated on pp. 172–4, where some account of the influence of modern machinery in the cotton manufactures is given. Here it will be enough to call attention to the fact that the changes due to this cause have all come about within little more than a hundred and fifty years, and that this applies even to the most important agricultural implements made of iron, which, along with agricultural machinery properly so called, have during the same period effected a parallel revolution in the condition of agriculture. The cast-iron ploughshare is an invention little more than a hundred and fifty years old (it was patented in England by Messrs. Ransome of Ipswich in 1785) ; and it was after the beginning of the nineteenth century that the cast-iron plough came into general use in America. In the present century steam as the prevailing means of driving machinery has largely given place to electricity and to various forms of internal combustion engines. Before steam came into use wind-power (chiefly in level countries) and direct water-power (chiefly in mountainous and hilly regions) were largely employed. Water-power, now used indirectly as hydro-electric power, has again come to be of first-rate importance. Even solar heat has been used as a source of power where the sunshine is sufficiently constant. The vast amount of tidal-power that might conceivably be utilised has again and again engaged the thoughts of engineers, but so far little has been achieved in this direction. Locally this power is used for such purposes as the deepening of harbour entrances, as at Venice and elsewhere, but the difficulties in applying this power to the driving of machinery have not been successfully overcome. Only in the most favourable conditions could this power be made available for any considerable portion of the day, and there is the added difficulty that the power is supplied three-quarters of an hour later every day. Nevertheless, a tidal mill was described as seen at work by Arthur Young in the Gironde in 1788, but it is a tribute to that keen observer's insight that he remarks that it is doubtful whether the power thus applied would prove as economical as that derived from steam by the newly improved steam-engine.

The utilisation of machinery in production is in some cases dependent more or less on physical conditions, in others on the supply and attitude of labour. The extensive employment of agricultural machinery is influenced very largely by the surface features, great level plains being obviously peculiarly favourable to its use. But even where the superficial configuration presents no great obstacles to its use the climate may prove a hindrance, soft wet soils being unsuitable or at least difficult for heavy machines. In coal-mining it is only the thicker and more continuous seams that are well adapted for coal-cutting machinery. This is one reason

why the use of such machinery has increased much more rapidly in the United States, where the seams of bituminous coal now worked are only such as can be worked easily, than in the United Kingdom, with its older industry, where most of the seams very easily worked in the older mines have been worked out. It is in the newer, larger, and deeper collieries of this country that coal-cutting machinery can be employed.[1] Where labour is very abundant and cheap the use of machinery may not be economic. Thus, in the countries of the Far East the proportion of machinery to the number of employees is very small, and it has on occasion been found economically advantageous to replace expensive machinery with low-priced hand machinery. In Great Britain, in 1907, 1·5 horse-power was used per person employed: in the United States, in 1899, 2·1; in 1914, 3·2 horse-power. The employment of machinery even where it would be economic is frequently retarded by the opposition of the workers to its introduction. In rapidly developing new countries or regions this hindrance is less marked, and that is another reason why coal-cutting and many other machines, even when invented in this and other old countries, have first been generally adopted in the United States. The attitude of the workers in old countries is at least intelligible. Their first thought with regard to machinery is apt to be that it is a means of displacing labour and so reducing its price; and though in the long run the effect of machinery may be to ease the burden of labour and increase the abundance of produce available for the labourer, its immediate effect is often to inflict hardship on some. If the workers cannot all share in the benefits of machinery from the first, it is natural that they should at least desire to have the incidental hardships of its introduction mitigated as far as possible. That gives importance to efforts which have been made towards such mitigation by large employers.

Particularly in the present century, the economic distribution of power has been greatly affected by the progress of invention, which has made sources of power commercially available that were not so before. In illustration of this one may refer to the very extensive use of oil, alcohol, and gas as sources of power. The use of oil has a geographical significance not merely in connection with the distribution of mineral oils and oil-shales, but also because of the ease of handling when the special requirements of its transport have been considered. The use of gas is important because it allows of inferior coals being employed for the production of fuel in this form, and the use of alcohol stimulates the production of potatoes as a cheap

[1] Percentage of coal cut by machinery:—

	1891.	1900.	1906.	1913.	1924.
U.S.:	5·3 per cent.	24·9 per cent.	34·7 per cent.	50·7 per cent.	69·5 per cent.
U.K.	—	1·5 „	4·1 „	8·6 „	19·0 „

In Britain the percentage reached 42 in 1933.

source of this spirit. But it has been chiefly with the aid of electricity that this kind of economy has been effected, and probably in no other direction has greater progress been made since the publication of the first edition of this work in 1889. Electricity is not a source of power. It is merely a means of transmitting and applying power developed either by fuel or gravity (moving water or air). When the great mechanical inventions were first introduced they were applied chiefly by means of water-power. Afterwards this gave place, except under the most favourable conditions, to the more reliable steam-power. The transmission of power originally derived from falling or rapidly flowing water by means of electricity has given value to many water-powers which were formerly useless. Power is transmitted economically distances of 300 miles. In certain industries electricity, most frequently developed from water-power, is already completely victorious over steam. These are the industries in which excessively high temperatures have to be produced, as in the smelting of aluminium ores, the manufacture of calcium carbide and the fixation of atmospheric nitrogen, or great resistances (including strong chemical affinities) have to be overcome, as in the grinding of wood to wood-pulp and the dissociation of elements in certain very refractory chemical compounds. In these cases immense water-powers are the sole means available for developing the electricity with the necessary economy.

But electricity is in some ways an advantage even where coal or other fuel is burnt in order to develop it. Though there is a loss of energy in converting the power latent in coal into the form of electricity and then converting electrical into mechanical energy, yet electrical power can be transmitted to a distance with less loss than steam-power. This leads to several economies. The coal can be used to develop electrical energy where it is cheapest. It can be used for that purpose in one great establishment on a large scale, instead of in many places on a small scale ; and in the end each one who uses the power can take for his requirements just as much as he needs and when he needs it. It thus becomes possible, where a great installation has been set up providing power up to a certain maximum required only occasionally, to make a certain proportion below this maximum, the so-called off-peak electricity, available at a cheaper rate for industries capable of making use of it whenever supplies can be obtained. Thus one gets rid of numerous steam-engines, each of which required its own attendants, and had to be kept ready for work at the cost of fuel, even at times when there was no work for it to do. It applies the power with great smoothness and steadiness, an advantage of great importance, for example, in the textile industries and in steel rolling mills in which it has become extensively used. When used for locomotion its advantages are various. More rapid acceleration is possible with electric

locomotives than with steam, and that is one great reason why it is becoming so largely used on railways with a dense traffic and numerous stoppages inasmuch as a more frequent service of trains is thereby facilitated. In the United Kingdom the use of electricity in industry was doubled during the War. In recent years the increase in its use has been specially marked since the linking up of the whole country by the ' grid ' system, whereby electricity generated economically on the coal-fields or at favourably located waterside stations can be readily transmitted to towns less fortunately situated.

Devastating Agents.—War, the great occasional disturber and hinderer of production and commerce, has already been considered, p. 11; but there are others with which one has to lay one's account as more or less normal though not regular in their action. These may be classed under two heads—physical destroying agents, the most important of which are directly or indirectly due to climatic conditions; and destructive forms of life, whether vegetable or animal.

Among the physical destroying agents we may mention first, **frost,** from which most tropical and sub-tropical plants, such as coffee, tobacco, p. 179, cotton, p. 164, &c., suffer greatly when they happen to be exposed to it.

In certain regions, and especially in those which have a climate at once warm and arid, hail is often much more destructive than we could expect from the character of the hailstones which usually fall in England. Reference is hardly needed to the destructiveness of **violent winds** at sea, but it may be noted that great devastation is sometimes wrought on land by the hurricanes of the north Atlantic, north of 10½° N. off the West Indies and Florida, the typhoons of the south China Sea, principally between the south coast of China and Formosa, the cyclones of the Indian Ocean, and especially the Bay of Bengal, occasionally raging nearly as far south as 6° N., and above all the tornadoes of North America, where such storms reach farthest north and farthest into the interior of the land. These violent storms occur mainly at the change of the monsoons—from April to June, and from September to November in the Indian Ocean; in spring and autumn elsewhere.

To certain crops, and especially those which depend greatly on the amount of blossom that comes to maturity, like fruit-trees, cotton, coffee, &c., great damage is often caused by unseasonable winds of less violence; but more destructive on a large scale than any of the agents yet named is **drought.** The regions liable to suffer most heavily from this cause are those which lie on the border-line between regions in which an abundant, or at least sufficient, rainfall can always be depended on, and those in which the rainfall is too scanty to admit of settlement without irrigation, but in which the rainfall, though sufficient in most years, is apt from time to time to fail. In the densely peopled regions of India and China

that are situated in such 'famine zones,' the failure of rain has often caused the loss of millions of human lives. Perennial irrigation and the improvement of communications have mitigated but not removed the dangers. In the less populous regions in the interior of North and South America, and in Australia, the destruction caused in this way is confined to sheep and cattle and other kinds of livestock. Despite the protection afforded by artesian wells and storage reservoirs, after the great drought of 1914 the number of sheep in Queensland dropped from 23·1 millions in 1914 to 15·9 millions in 1915.

Great destruction is sometimes wrought by **inundations** on the banks of great rivers like the Hwang-ho, Mississippi, and the Ganges, or even like the Danube and some of its more important tributaries, and on low-lying lands in the neighbourhood of the sea. Stupendous embankments have been constructed along the Ganges in Lower Bengal to guard against this danger, but these restrain 'without altogether preventing' the excesses of the inundations; and the same may be said regarding the similar works that have been executed in the United States and the Hungarian plains, on the banks of the rivers above named. Among the more memorable excesses of the sea may be mentioned that by which the greater part of the present Zuider Zee was submerged (thirteenth century), and that by which an area of about 3,000 square miles at the head of the Bay of Bengal was overwhelmed, and many thousands of people lost their lives, during a cyclone in November 1876.

Volcanic outbursts and earthquakes, though fortunately comparatively rare occurrences in their more awful forms, may also be mentioned as physical agents which occasionally produce widespread destruction. The Japanese earthquake of September 1923 resulted in the death of nearly 100,000 people, inclusive of those who perished in the fires which followed.

The **living destructive agents** are probably on the whole more injurious than any of the physical agents above mentioned, inasmuch as many of them are extremely persistent, being very difficult to extirpate, and renewing their attacks on particular crops or on various forms of vegetation, animals, and man year after year. The mere enumeration of such destroyers would fill a volume, and whole volumes have been devoted to accounts of individual pests of this kind, and here accordingly we can only allude to a few of the more important.

The **vegetable pests** consist mainly of minute **fungi** which affect various parts of a plant and indicate their presence by the discoloration they produce. Such, for example, are the fungi which produce the disease known as rust in cereals, that known as mildew on the vine (p. 141) and on many other plants, subject to attack each from its own fungus, and the fungus (*Hemileia vastatrix*) which has

almost completely destroyed the cultivation of the coffee-tree in Ceylon.

Of **animal pests,** the most destructive, on the whole, are insects. Among these may be mentioned locusts, different species of which infest treeless regions in both the Old World and the New. From time to time they invade cultivated fields, where they arrive flying in thick solid masses, filling the air, darkening the sun, forming an immense unbroken cloud, which may take more than an hour to pass by, and, when they settle, consuming every green thing to be seen, the working of their jaws meanwhile causing a sound which can be heard at a great distance. Equally sweeping in its destruction is the insect known in the United States as the army-worm, which is the larva or unwinged stage of a kind of moth, and owes its name to the fact that on the march the ' worms ' all keep together like an army of soldiers, and usually advance in a straight line. Of grass or young grain that comes in their way they eat up every vestige, but when grain has grown enough to form a head, they eat only the leaves, and then climb up the stalk, cut off the head, and drop it to the ground. Among insects destructive to particular objects of cultivation may be mentioned the Hessian fly (*Cecidomyia destructor*, Say), which attacks wheat and barley, and has proved peculiarly destructive in various parts of the United States, so as to lead to the abandonment, for a certain time at least, of wheat cultivation in certain districts ; the Colorado beetle, which wrought great ravages among the potatoes in the United States in many years subsequent to 1861 ; the phylloxera, which for a time put an end to the cultivation of the vine in several Departments in France, and greatly reduced it elsewhere ; the boll-weevils and boll-worms (really moth caterpillars), which for many years have done enormous damage to the cotton crops of the United States and Egypt. Other insects are the carriers of disease to domestic animals, as well as to human beings. To the lower forms of animal life belongs the parasite which produces the silk-worm disease. Among destructive animals of a higher type may be mentioned, first, sparrows, which have multiplied so rapidly since they were introduced into Australia that they have become a regular plague to the farmer. But a still more serious plague, both in Australia and New Zealand, has grown out of the introduction of the rabbit, the multiplication of which has in some instances compelled squatters to abandon their sheep-runs, and cultivators their holdings, and has already caused different Australian governments to expend hundreds of thousands of pounds in efforts to extirpate it, or rather to keep it down, since extermination seems impossible. Rats have proved equally destructive among the sugar-canes of Jamaica. The mongoose, a small but fierce carnivorous animal somewhat like a ferret, which was introduced into that island with great success to destroy the rats, has

since become almost as great a pest itself through its raids on domestic poultry. It should be noted that in many of these cases the most serious results have accrued where man by the introduction of plants or animals from other localities has upset the local ' balance of nature.' In the parts of the Argentine Republic that have a similar climate to the pastoral regions of Australia, the native vizcacha, an animal with similar habits to those of the rabbit, is quite as destructive, and has likewise been the object of all sorts of devices to compass its extermination.

Minute organisms are the causes of many diseases in man which have a serious effect on production in the regions in which those diseases are prevalent, and it is fortunate that in recent years remarkable progress has been made in the knowledge enabling man to combat those diseases, and thus to give a much greater value to the regions affected. Some of these organisms are conveyed to man by insects. Malaria, yellow fever, sleeping sickness, and elephantiasis all belong to this class. Malaria is almost confined to those areas in which the mean temperature exceeds 60° F. for the summer months, and on the whole it increases in virulence towards the equator. It is now known to be set up in man by a microscopic organism introduced into the human system by mosquitoes belonging to the genus *Anopheles*, and in consequence of this discovery the disease has already been extirpated in many places in which it was formerly rife. Two methods are adopted in fighting against the disease. One is to destroy the mosquito, which is done when the insect is in the larval state. In that stage it lives in water, and where the water which might rear the larvae cannot be drained away, a thin film of oil on its surface will prevent the larvae from breathing. The other method is to destroy the animal parasites in the human body by doses of quinine. The discovery of the whole process of infection threw light both on the well-known connection between the various forms of malaria, including ague, and stagnant water, and also on the fact that all marshy districts, even in warm regions, were not malarial. Even where the mosquito was present the malaria parasite might be absent.

In Cuba and in Panama, the war against yellow fever was waged with such success by Colonel W. C. Gorgas, a United States doctor, that it has now been entirely exterminated. The insect carrier in this case is the *Stegomyia fasciata*, and the immediate excitant a microscopic spirochæte. More stubborn is the resistance offered by sleeping sickness, a disease which is known to have been endemic in Africa for hundreds of years. From time to time it appears to break out as a scourge, and has carried off thousands in Uganda, the Congo region, and other parts of Central Africa. The disease has been ascertained to be due to an internal parasite, *Trypanosoma gambiense*, transmitted chiefly by a species of tsetse fly, *Glossina*

palpalis, which is confined to the immediate vicinity of expanses of water, and this knowledge has led to methods of protection which have had considerable success, though the disease is far from being vanquished. The discovery that the immediate excitant of the disease is also sometimes carried by the tsetse fly that causes cattle disease, *Glossina morsitans*, which has a wider range in latitude, gives reason to fear the possible extension of the disease farther south. Elephantiasis, of which the leading symptom is a swelling of the skin and the adjacent cellular tissue, a disease prevalent on the coasts of West Africa, India, southern China, the South Sea Islands and Brazil, is due to a filaria or microscopic worm carried by a group of the genus *Culex*, and has also so far baffled efforts for its extirpation.

Other diseases sometimes appearing as widespread epidemics include plague, which is of two types, the bubonic, characterised by a swelling of the glands, and the lung form. Both are due to bacteria, of which the carriers are rat-fleas. There is no limit to its geographical range. The Black Death of 1348–49, which was of the lung type, raged in the high valleys of the Alps as much as on the plains, in Greenland as much as in Italy. It is diffused along the lines of commercial intercourse, but fortunately modern sanitary regulations are sufficient to cope with it, at least in the temperate zones. Cholera was long endemic from Bombay to southern China, but more particularly in Lower Bengal, and occasionally spreads like the plague along the lines of human intercourse. Again and again the great annual religious concourse at Hardwār, where the Ganges enters on the plains of India, has been the source of an outbreak, which has spread far and wide, and in the latter years of last century with a rapidity which corresponded to the improvement in the means of communication. An epidemic which started there in March 1892 reached St. Petersburg in less than five months, and before the end of August reached New York. In this case the protection now afforded by good sanitation is complete. Improved sanitary conditions have almost extirpated in Europe the once nearly universal disease of leprosy—another disease due to bacillus infection. The disease still has a firm hold in southern Asia, however, including the west coast of India, and has been introduced into America. Scurvy, which at one time took so heavy a toll on seamen—on his pioneer voyage to India and back in 1497–99, Vasco da Gama lost 100 out of a crew of 160—was gradually eliminated after the discovery, in the latter part of the eighteenth century, of the means of warding off the disease by a diet of fresh fruit or fruit juices (lime juice) and vegetables. Of recent years influenza has taken a toll of human life comparable with the plagues of the Middle Ages. Indeed, it is one of the serious aspects of modern life that as man's medical skill conquers one disease after another,

others arise which were previously either little known or were mild in their attacks.

IV. CIRCUMSTANCES CONNECTED WITH THE EXCHANGE OF COMMODITIES

TRANSPORT.[1] Transport of commodities and human beings is a fundamental feature of life and commerce, both ancient and modern. The methods which are employed vary considerably from country to country, and from region to region, being dependent upon a number of geographical and historical factors ; they may be conveniently grouped into seven categories, as follows :—

1. Human porterage, including wheeled vehicles moved by human labour.
2. Animals, used (*a*) as beasts of burden ; (*b*) for draught purposes.
3. Modern roads ; and the internal combustion engine as employed in motor-cars, omnibuses, and lorries.
4. Railroads, including (*a*) light trackways and tramways ; (*b*) railways proper, worked by steam, electricity, or other method.
5. Inland water transport—rivers and canals.
6. Ocean transport.
7. Air transport.

In order that we may appreciate the benefits which improved means of conveyance have conferred upon mankind, it will be worth while to allude briefly to some of the primitive and laborious modes of carriage still in use in some parts of the world.

1. Human porterage.—In central Africa, in various parts of south-eastern Asia, and even in densely peopled districts of China, the movement of goods overland still takes place to a large extent by means of **human porters,** or by wheeled vehicles drawn or pushed by men. Prodigious loads are sometimes carried under exceedingly difficult climatic and topographical conditions by these 'coolies,' as for example in the tea traffic between south-west China and Tibet, when the normal load per man is 200 lbs., and two mountain passes more than 7,000 feet above the level of the starting-place have to be scaled, with about 120 miles to be covered in some twenty days. The wheel-barrow is still in common use in northern China, where human labour is cheaper than animal labour, and where every inch of the land is so precious that the narrowest possible roads are used, such as will accommodate a wheel-barrow but not a two- or four-wheeled cart. Human labour was also the principal means of transport in Japan until the revolutionary changes which have taken place during the last few decades.

[1] This section, pp. 77 to 87, has been revised by Mr. S. H. Beaver, M.A.

2. Animals.—Where the large domestic animals are abundant, it is scarcely necessary to say that by their use the call for human labour in transport is greatly reduced. The animals may be used actually to carry loads, or more usually to draw wheeled vehicles, the latter use depending upon the nature of the topography and the existence of some prepared trackway. Even in the most highly civilised countries animal transport is still of great importance, especially in rural districts, though in general it may be said that in those countries where western civilisation has advanced furthest, mechanisation of transport is tending more and more to displace the animals. In most European countries, and in those which have derived their civilisation from that of Europe, by far the most serviceable animal is the **horse**, used as a draught beast, but in central and eastern Europe the **ox** is of greater importance—perhaps a comment on the greater velocity of life in the West, the horse being valued for its speed, the ox for its strong, steady, if rather leisurely, pull. In southern Europe, and the regions round the Mediterranean generally, the **ass**, which thrives better than the horse on the scanty herbage, is an animal of much more consequence than in the rest of Europe, and hence is more cared for and of finer aspect and better qualities ; and in the mountainous parts of those regions the **mule** is preferred to both on account of its sure-footedness and endurance, and to the ox on account of its sharing with the ass the power of thriving on coarse browsing. These qualities have secured the introduction of the latter animal, which was used by the ancient Greeks, into all mountainous countries with a moderately warm and dry climate, both in the Old World and the New.

In the most populous parts of Asia and in central Africa various breeds of oxen are the principal beasts of burden ; and next to these, in Asia, come buffaloes, horses being for the most part neither numerous nor of good quality. The water-buffalo is also found in south-eastern Europe.

Amongst other animals of distinctly regional importance only may be mentioned the following. **Reindeer** are used, notably to draw sledges over the snow-covered ground, in northern Asia, Europe, and North America ; **dogs** are also employed, as by the Esquimaux, for the same purpose. In the mountainous parts of central Asia, including the Himalayas, a peculiar species of ox, known as the **yak**, which is found both wild and domesticated, and is characterised by long fine silky or slightly curly hair hanging down from various parts of its body, is used as the mule is used in southern Europe. In some parts of the same region goats and sheep are employed for the carriage of light burdens, and goat-carts may still be seen in the Alpine region of Europe. In the Andes of South America, the **llama** is the principal beast of burden. The Asiatic

elephant, which haunts the forest of south-eastern Asia from the south of the Himalayas to the borders of China, and the large tropical islands from Ceylon to Sumatra and Borneo, is invaluable as a beast of burden throughout that region, wherever there are no proper roads. Where roads do exist, it does not accomplish so much work in proportion to the amount of food which it consumes as the horse, ox, or buffalo, but it can make its way across marshes and through forests which could not be traversed by any of the other animals mentioned. Throughout India, the catching of wild elephants for training is under government supervision ; the chief area is now, however, in Burma, where the animals are used mainly for timber haulage in the forests. The African elephant is no longer trained for labour, though it was so by the ancients (*e.g.* the Carthaginians), and, as in north-eastern Africa, down to the Middle Ages. The **camel**, in desert and semi-desert regions, is even more indispensable as a beast of burden than the elephant amidst forest and marsh. Provided with one or two humps of fat, which serve as reserves of nutriment, and with its stomach lined with hundreds of little cells or compartments capable of holding water, a camel when well fed and supplied with water at starting can accomplish immense journeys on the most meagre fare, and almost without drink. By no other animal is so much merchandise carried over long distances. Until the recent advance of the motor-car and the aeroplane, it was the sole means of commerce between the oases of northern Africa, as well as between the north African coast and the fertile territories of the Sudan, and it is still largely employed in western Asia. It was introduced into Australia, and was used on exploratory journeys, but has been replaced now by the motor-car. Camels were seldom used singly, but in ' caravans ' often consisting of several hundreds, not only for the sake of carrying a large quantity and variety of merchandise, but also for the sake of having a sufficiently large body of men to defend the caravan against the bandits by whom the deserts were frequently infested.

The simplest method of using animals for transport is to employ them as beasts of burden, like the pack-horses which formerly carried most of Britain's internal trade ; but this method is far from being the most efficient. An immense advantage is gained by employing the beasts to draw wheeled carts. One animal, broadly speaking, can pull at least four times as much as it can carry. Even in roadless and trackless country, teams of oxen, as in South Africa and in the Argentine, are employed to haul agricultural produce in strongly built wagons. For the most part, however, the use of wheeled vehicles involves the making of **roads.**

3. Roads.—The development of road vehicles during the last 150 years, together with the rapid progress of new methods of transport during the present century, have involved vast changes in the

technique of road construction.[1] Roads that were adequate in foundation, surface, and width for the meagre traffic of horse-drawn carts a hundred years ago are almost useless for modern high-speed motor traffic. Until comparatively recent times most roads have been dependent upon locally obtained raw materials for their construction ; consequently, in clay areas, where natural road-metal is absent, communication was apt to be difficult in winter because of mud, and unpleasant in summer on account of dust. This is still to a large extent true of considerable areas of the earth's surface, such as the Hungarian Plain, western Siberia, and the plains of Australia and the Argentine. There are many well-known descriptions of eighteenth-century English roads running across the clay belts of this country to be found in the works of travellers such as Defoe and Young. Heavy lumbering carts with their numerous horses cut the roads into deep ruts, and the laying of stones only served to make progress more dangerous and uncomfortable for travellers on horseback or in wheeled vehicles. Under such conditions it is not surprising that Edinburgh was 10 to 12 days' coach journey from London, Exeter 4 days, Birmingham 2 days, and so on. It is true that the formation of the Turnpike Trusts, which devoted part of the toll-money collected from vehicles to the maintenance and improvement of the road surface, helped to improve many of the main roads of Britain, but little real advancement was possible until scientific principles, which had been almost dormant since the building of the Roman roads, were introduced into road construction. The two names most deservedly famous in this connection are those of Telford and Macadam, two Scotsmen who laboured in the early part of the nineteenth century.

Telford's method consisted of laying a foundation of solid stone blocks and covering this with a layer of small broken stone, thicker in the middle than at the sides so as to produce a camber which, with the provision of adequate ditches on each side, would effectively drain the road. He spent eighteen years in the Scottish Highlands building over 900 miles of roads and, in addition, is justly famed for his reconstruction of the Shrewsbury-Holyhead road during the years 1815–30. Macadam's system was based on the principle that if a road is made of suitable material and is well drained it can be laid on the natural subsoil without the intervention of Telford's costly stone pavement. His roads were made of a sheet of broken stone of uniform size, each piece an inch or two in diameter, the road being cambered to throw off surface water. He found that such a sheet of broken stone, after rolling by traffic, became firmly bound together as an impermeable mass, and so resisted the ravages of water. Limestones, which yield a fine powder when pieces are ground together, were found to be the most suitable rock ; rain-

[1] See J. W. Gregory, *The Story of the Road.* London, 1931.

water and this powder formed a natural cement—or the process could be hastened by a light road-roller and a water-cart.

Both Telford's and Macadam's roads were effective so long as horse-drawn wagons with iron-tyred wheels formed the bulk of the traffic. So soon, however, as the perfection of the internal-combustion engine permitted the development of the motor-car, they became inadequate owing to the unsuitability of their surface. A rubber-tyred wheel, caused to rotate by an engine, exercises a disruptive effect upon a road surface composed of small stones, especially during wet weather, when the rubber acts as a sucker and pulls out any loose stones; whilst the dust raised by the passage of swiftly moving vehicles in dry weather rapidly becomes an intolerable nuisance, as it does in those parts of the world, such as south-eastern Europe, where the motor-car has preceded the construction of suitable road surfaces. The removal of the fine dust particles, too, contributes to the rapid disintegration of the road surfaces. A motor road requires a surface so coherent that it resists disruption by the uplifting of stones by the tyres, and the scattering of the finer particles as dust. Such surfaces are usually prepared either by the use of concrete, as in America, or, as is more commonly the case in Britain, by employing 'tarmacadam'—broken stones coated with tar—sealed with tar or bitumen. The use of tar on roads was one of the first remedies for the problem of dust; the tar also acts as a waterproof coating and so delays the decay of the road through the penetration of water and the disruptive action of frost.

Many varieties of stone can be used for the purpose of road-making, but limestones and close-grained igneous rocks, such as basalt, are the most reliable. Coarse-grained rocks, such as granite, do not make good macadam because the large individual crystals tend to crack; granites are, however, successfully employed in rectangular blocks called 'setts,' especially in industrial districts where much heavy traffic has to use the roads. The unequal weathering of the constituent crystals keeps the surface slightly rough, and so suitable for horse traffic. Blast-furnace slag, crushed into pieces and tarred, is also much used for macadam in districts where it is produced. Gravel is also commonly used where it is available, especially as a surfacing material.

There is no doubt that the modern motor road is unsuitable for horse traffic, owing to its smoothness. In rural areas the difficulty is sometimes resolved, especially on hills, by the provision of a rougher macadam trackway on either side, but in cities there are increasing signs that horse traffic may eventually, owing to its slowness, be severely restricted, if not entirely prohibited.

Some idea of the extent of road traffic at the present time may be gained by realising that in the United States there were in 1934

about 25,000,000 motor vehicles (half the world's total), roughly one for every 4·5 persons. In Great Britain in the same year there were 2,500,000, or one to every 20 persons. Private cars are by no means the whole of the motor traffic. Given a great stimulus by the Great War, the building of lorries has grown by leaps and bounds, and both in the ' old ' and in the ' new ' countries this type of vehicle now plays an important part in everyday life. In Britain the motor lorry, by providing cheap and fairly rapid door-to-door transport of small loads, has made great inroads into the traffic formerly carried by the railways (*cf.* pp. 318 *et seq.*) ; in countries less well covered by a rail-net, and in countries, such as the ' pioneer belts ' of Africa and elsewhere, where the railway has not yet arrived, this vehicle is assisting greatly in the opening up of such areas to economic development. Rough roads that will carry a lorry are far more cheaply and quickly constructed, and much less trouble to maintain, than are railways. The use of six wheels instead of four, and the mounting of vehicles on ' caterpillars,' are devices that have been developed to overcome the difficulty of rough pioneer roads.

Finally, the motor-omnibus, capable of carrying anything from one to six dozen passengers, has done much to promote the spread of intercourse between rural and urban areas, and has been an important factor in the outward spread of large cities such as London. There is a tendency for omnibuses to replace trams (p. 86) in many towns nowadays, both in Britain and on the Continent.

4. Railways.—The difficulty of hauling large quantities of bulky commodities over the ordinary country roads in the days before Telford and Macadam was responsible for the growth, in the eighteenth century, of numerous railways in the coal-mining and iron-working districts of Britain, especially in Northumberland and Durham, where the boulder clay soil provided an indifferent foundation and where gradients down to the rivers were steep. Even the Romans had laid stone tracks for their wagon-wheels ; it was a short step from this to the laying of timber baulks covered with iron plates (hence the term ' platelayer ' still employed on our railways for track-maintenance men) and so to actual iron rails, flanged to keep the wheels from slipping off. Transfer the flanges from the rails to the wheels, and the idea of the modern railroad is complete. Between 1801 and 1825 no less than 29 ' iron railways ' were constructed in Britain, mainly in connection with collieries, ironworks, or canals (p. 89), and using horses as the means of hauling wagons along the rails. The coincidence of this period with that of the development of the steam locomotive has produced the railways that we know to-day. James Watt began building stationary steam engines on a commercial scale in 1775, and between 1801 and 1825 such men as Trevithick, Hedley, and Stephenson were responsible

for applying Watt's invention to the problem of locomotion. The first steam railway for general purposes was that between Stockton and Darlington (really designed to give an outlet to the Tees for the coal from Witton Park in Durham) opened in 1825. The Liverpool and Manchester line followed in 1830. In 1831 the first passenger train ran on the American continent—from Albany to Schenectady in the state of New York; and in 1835 the first railway on the mainland of Europe was opened, between Brussels and Malines.

Topographical controls of railway routes are more obvious than those affecting roads. The problem of the railway-builder lies midway between those of the road engineer and the canal builder. High-speed express-train working becomes difficult when frequent gradients steeper than about 1 : 100 are encountered—though it is possible to work trains by the normal method up gradients of 1 : 22, as on the Kicking Horse Pass line through the Rockies. It has been estimated that the cost of working a given train-load over a mile of track on a gradient of 1 : 50 is twice that of working the same train over a mile on the level. Hence the most elementary factor in geography—the relief of the land—is of great importance in controlling the routes which the lines shall take. In Britain the Tyne gap, Aire gap, and Shap routes may be cited as examples of the intimate control of railway routes by physical features; one may notice also that railway routes frequently do not follow the lines of the roads which preceded them. Thus the railway across the Cheviots does not follow the course of the old road connecting the valleys of the Rede and the Jed across Carter Bar; further afield, it may be recalled that the railway from Florence to Bologna does not follow the old direct route across the pass of La Futa; the line from Sofia to the Maritza valley does not follow the Roman road through Trajan's gate, and so on.

The superior utility of railways over roads has in many cases justified a vast expenditure in subduing the face of nature in order to make routes for the lines where the features of the country did not afford them. Hence it is that railways, besides being made to climb the Andes to a height of 15,600 feet (on the Lima-Oroya line) have been pierced through the Alps in tunnels of from seven to more than twelve miles in length. In mountainous countries, too, abnormal types of railways have made their appearance; notably rack-railways, of which type the Abt system is most commonly used, in which the locomotive can use the rack or toothed rail on steep sections (even on gradients as steep as 1 : 2) and on level tracks can proceed in the ordinary manner. The first mountain rack-railway was that up Mount Washington in New Hampshire, U.S.A., completed in 1868. Since that date numerous examples have been built in various parts of the world especially in Switzerland. Many such railways have been built for purely tourist purposes,

such as the Snowdon Mountain railway, but one European main line, the connection from the Adriatic coast to Serajevo, employs the system in its ascent of the Dinaric Alps, and so also do several main lines in South America—as from Arica to La Paz.

Mountains are not the only obstacles to continuity of railway lines. In order to extend the facilities for communication by rail without break of bulk, even wide stretches of sea and lake are in some cases not allowed to interrupt the railway transport, and train-ferries consisting of specially constructed vessels having rails laid on their decks, are employed to transfer whole trains across the intervening water (train-ferries). The channel separating Denmark from Sweden has long been overcome in this manner ; for some years a goods train-ferry has been in operation between England and the Continent *via* Harwich, and in 1936 the first passenger ferry service was opened between London and Paris *via* Dover-Dunkerque.

The mode of development of a railway system or net may take on two quite different forms, according to whether the country is an undeveloped or a long-settled region. In a virgin area, like the prairies of Canada sixty years ago, large scale settlement is almost impossible owing to lack of means of communication. Thus, until the completion of the Canadian Pacific Railway in 1883, western Canada was practically uninhabited, and settlement closely followed the first lines of railway. In such a case the railway may quite definitely be said to have developed the country ; even to-day little wheat is grown more than twenty miles from a railway. In the same way the railway lines of the Argentine Pampa, and of the Middle West of the United States, have provided a basis for settlement. Quite different is the state of affairs in an already developed country such as Britain. Here the railway routes were dependent on pre-existing conditions—the distribution of population, especially the position of towns and industries, and the existence of developed natural resources, such as minerals and harbours. The initial function of the railway in this country, which had so recently undergone a rapid transformation owing to the reshuffling of industry and population consequent upon the changes in industrial method which comprise the 'Industrial Revolution,' was that of connecting places which were already important. The lines at once stimulated the industries of the regions they served, and this growth encouraged the construction of further rail connections. Junction points began to attract population and industry, and at certain junctions whole new townships sprang up, such as Crewe and Swindon. The railways, too, helped to foster the growth of their seaport terminals, and in several cases were responsible for the entire construction of new ports, such as Southampton and Immingham.

Geographical factors affect in various ways the working of railways. It is obvious that a railway locomotive must haul the vehicles containing the load as well as the load that has to be transported, but it is only the load on which freight is earned. Hence it is desirable to have a railway wagon reasonably light in proportion to the paying load. Large wagons present this advantage, so that the use of large wagons is economic where sufficient loads can be regularly obtained for them. But it is not everywhere that convenient loads for large wagons and long heavy trains are available. Where there is a large amount of bulky goods such as grain, coal, ores, and timber to be conveyed to single points the advantage of large wagons is great, and it is greatly enhanced when there are such loads in both directions. It is said that the idea of reducing transport expenses by the adoption of larger wagons originated in the grain-growing regions of the north-west of the United States. Much has been said for many years on the advantage of introducing large railway wagons into Great Britain, but it is often apparently forgotten that the conditions there are in a large measure different. Where wheat is grown in enormous quantities in comparatively small areas in Manitoba or Minnesota, and a large proportion of it has to be transported to one or two great markets, the problem is entirely different from that of collecting wheat in forty or fifty counties and redistributing it in ten thousand towns and villages. In America it has been found profitable in some cases to use 50-ton steel trucks, nowhere more advantageously than on the lines connecting Pittsburgh with the lake ports, where the trucks can be filled in one direction with iron ore, in the other with coal. There it was estimated that the substitution of these trucks for the older 30-ton wooden ones effected a saving of 315 tons dead weight on a 1,500-ton train, and one of nearly £9,500 in freight on thirty double journeys in the course of the year. Trucks smaller than those in ordinary use in America but much larger than the familiar trucks of Great Britain are employed on the continent of Europe. A single system in Britain may have from 500 to 600 goods stations, and to nearly every one of these a truck may be sent every night, but in many cases those trucks carry only from half a ton to two tons. The advantage of constructing 50-ton 'cars' for such loads is not obvious and experiments with 20- to 40-ton trucks in Britain have not proved generally successful. The Great Western Railway introduced trains of 20-ton wagons (each 24½ feet long by 8 feet 8 inches high) for the carriage of coal in the South Wales mining region, and the experiment was tried long ago by the L.N.E.R. The original construction of the British line (as to dimensions of tunnels, turn-tables, &c.) does not admit of the use of the wider rolling stock of the Continent though the gauge is the same.

Where the conditions favour heavy traffic, great savings can be

effected by having long trains even though these may be made up of small trucks, but the savings of course are all the greater where there are long trains of large trucks. Long trains also are more common in America and on the Continent than in Great Britain, and for the same reasons as large wagons. It is to promote this economy that certain railway centres in America, known as basing-points, are made the foci of railway rates for large districts round, goods being carried between these points at exceptionally low rates, and the rate being thus cheapened for the whole district served from any focus.

In the early days of railway construction several gauges were used, but after the abolition of the G.W.R. broad gauge in Britain in 1892 all main lines have been on the standard gauge of 4 feet 8½ inches. This is also the gauge of continental Europe (except Spain and Russia), and of North America. Several countries, notably Australia, Argentina, and India, suffer from a mixture of gauges.

The construction of light railways, by which are usually meant railways so constructed as to involve comparatively small original cost and outlay for upkeep, has been carried on in France since 1865, and in other continental countries as well as the United States from later dates. The Belgian system, begun in 1885, is one of remarkable completeness, utilising, to a large extent, the country roads. In 1896 an act was passed in this country authorising and regulating the construction of light railways, but fortunately little was done before the internal combustion road vehicles began to develop so rapidly as to render most light railways obsolete.

About 1870 began the extensive development of tramways as passenger carriers in Britain. Nearly all the original tramways were private enterprises and the vehicles were horse-drawn. In 1882 an Act was passed enabling local authorities to purchase any electrical installation at the end of twenty-one years without making any allowance for goodwill. This, and other deterrent legislation, hindered the application of electricity to tramways in Britain, and though the term was subsequently altered in 1888 to forty-two years, the influence on investors remained. In 1928–29 there were 221 tramway undertakings and 2,420 miles of track in Britain. By 1934 the mileage had dropped to 1,763, and it is clear that British towns have taken the lead in abolishing the obsolescent trams in favour of the more flexible motor-omnibuses. In some areas the electrical installation is still used, but the rails removed, 'trolley buses' being used instead of the tramcars or street cars. In America it is the privately owned motor-car which has rendered almost useless the street-car systems.

In another direction, though Britain has hesitated to adopt main-line electrification, the Southern Railway has developed, since the

War, the largest electrified suburban railway system in the world and is extending electrification to its main lines. The system used is the third-rail system.

For traversing rough or steep ground or for lifting, ropeways and cableways are of great advantage. The buckets are usually drawn by ropes but hang on a stationary cable. A cableway demands little roadway. It can, in fact, be carried over fields and pasture-lands without interfering much with agricultural operations; and it can easily be constructed over uneven ground, and even across streams, as well as less formidable obstacles. In a cableway a single load may amount to as much as eight tons. Where the cableway is worked and controlled electrically, the system is known as telpherage. In this system the loads are small, the maximum about one ton, but the buckets carrying the loads may follow one another at the rate of three a minute. The first telpher line in England was opened in October 1885 at Glynde, in Sussex. It was rather less than a mile in length.

The pneumatic transmission of telegrams in light boxes through tubes by increasing the atmospheric pressure or diminishing it (by suction) was adopted as far back as 1853, and in 1913 the system was extended by the London Post Office to parcels.

Water carriage has, within the last hundred years, undergone as great a revolution as land carriage. The simplest form of water carriage is that in which rafts are allowed to drift down the course of a river. The use of boats on rivers, both for down- and up-stream navigation, must, however, have been one of the earliest of human inventions; and in some parts of the world, as in Russia and the valley of the Ganges, the want of roads was long to a large extent made up for by the abundance of navigable rivers. Such rivers being means of transport given wholly or largely by nature are apt to have their importance exaggerated in the minds of geographers, but it should now be recognised that nature has generally done more for a country in providing it with facilities for railway construction than with navigable rivers, in so far as these are merely inland waterways and not, so to speak, extensions of the seaboards, that is, directly accessible to sea-going vessels. Railways have the advantage over rivers not merely of greater speed, but the even greater advantage of intercommunication with different parts of the country, and these advantages in most cases more than compensate the disadvantage of dearer haulage. And with respect to intercommunication with different points, it is important to note that a railway generally has a great advantage even over a river on a parallel course. A waterway is of no use unless there are places on it where goods may be landed and lifted, but good navigable rivers are apt to flow for long stretches through marshy and unstable country without landing places. It is this character that greatly diminishes the value of the

Po as a waterway, and the Mississippi flows in places for mile after mile without the possibility of discharging goods, where the parallel lines of railway have numerous stations. The utility of a river as a waterway is, moreover, affected by the weather to a much greater extent than are railways. Nearly all rivers are subject to great variations in level. The St. Lawrence is in this respect an exception, as the steadiness of its flow in the open-water season is maintained by the chain of great lakes of which it is the outlet, but it is a unique exception. Hence traffic on most rivers is apt to be stopped or impeded by high and low water, high water rendering them unnavigable on account of their impetuosity, low water from inadequate draft. Then again, where the winter is severe there is a regular stoppage of traffic through ice. Nevertheless, large rivers on which steamers can be used still form important means of communication, and especially in countries not yet fully opened to modern commerce. The best of such rivers have one great advantage over railways, that it is easier on them to transport great quantities at one time. A train load of more than 7,000 tons—considerably less in the United Kingdom—may be regarded as something quite exceptional, but on the Rhine, for instance, it is easy to exceed that in barge-trains. If they served no other purpose they would still be of commercial value as tending to keep down rates on competing lines of railway.

Navigable canals are another means of transport dating from the unrecorded periods of human history, and they also have had their importance diminished by the introduction of railways, though in some regions they have played a very important part in the development of commerce. Level countries and regions are naturally those which abound most in canals, and in such, one of the chief uses of rivers is to feed navigable canals, as in more mountainous districts one of the chief uses of rivers is to afford water-power. The most important canals of modern times, however, are the **ship-canals** connecting different seas.

Somewhat delusive expectations of economy in transport from the use of inland water carriage are sometimes entertained. These are all based on the admittedly low cost of mere haulage at a slow rate. It is estimated that on an ordinary good wagon road a single horse-power will drag about 3,000 lbs. at the rate of 3 feet per second ; on a railway about 30,000 lbs. at the same rate ; in water up to as much as 200,000 lbs. But in making inferences from this general fact it should be borne in mind (1) that the cost of increasing the rate of speed is much greater by water than by land ; (2) that the average rate of transport on canals is greatly reduced by the delays at locks ; (3) that the economy of water transport is greatly reduced by the fact that even canals do not afford the same facilities as railways for conveying goods over the face of the country without

break of bulk; (4) that canals are in most cases of too small dimensions for modern requirements; and (5) that the maintenance of an adequate supply of water in canals may be difficult and expensive.

With regard to the first of these points it is noteworthy that some of the earliest experiments with steamboats were made with the view of increasing the speed and economy of transport on canals. Since the screw propeller was introduced, these experiments have been renewed with greater success, seeing that its use is not so likely to injure the canal banks. To prevent destruction of the banks, mechanical propulsion is prohibited on many canals, including some of those of Britain. In other cases concrete banks have been made. A few attempts have been made to increase the speed by the use of locomotives on the canal banks. Experiments in this direction are indeed old. This mode of traction was tried on the Forth and Clyde Canal in 1839, steam locomotives being used. More recently electric motors running on rails on the banks have been employed both in France (on the Burgundy Canal) and Belgium (on the Charleroi Canal); but in the latter case the experiment has been abandoned. This method is, however, used in taking vessels through the locks of the Panama Canal. Electric propulsion with the aid of overhead wires has been tried with success on a section of the Staffordshire and Worcestershire Canal. The current consumption was found to be one unit per mile — at 1*d.* per unit 0·03*d.* per ton-mile.

In view of the importance of the second consideration above mentioned, the map (p. 332) of the English waterways has been drawn up so as to show the numbers of locks. The delays due to this cause have given rise to various projects for economising time in surmounting differences of level in inland navigations. Hydraulic and pneumatic lifts are employed. In 1875, an hydraulic lift, with a lifting power of 100 tons, working through a height of 50 feet, was completed to connect the Weaver navigation at Anderton, in Cheshire, with the Trent and Mersey Canal. One of more complicated structure, with a capacity of nearly 600 tons and a somewhat higher range of working, was completed in 1899 on the Dortmund-Ems Canal at Henrichenburg not far from Dortmund. Inclined planes have been employed from a very remote date in China. In April 1910 the Grand Junction Canal substituted inclined planes for the flight of ten locks which formerly overcame a height of 75 feet at Foxton in Leicestershire. The boats ascended and descended inclined planes simultaneously in wet docks which moved up and down on rails, a stationary steam-engine effecting the lift. By this means two boats were moved up and down simultaneously in 12 minutes, while formerly one hour and 20 minutes was required for passing a couple of boats in either direction. The Foxton lift

was closed in November 1910, as there was not enough traffic to warrant the cost of working it.

The difficulty of intercommunication by inland waterways without break of bulk arises from the fact that it is not practicable to construct canals in as many directions as railways, and the full advantage of such intercommunication, even where it is possible, can in many cases not be enjoyed, owing to the inevitable differences in canal dimensions. The larger the waterways the greater is the economy in the transport, but the construction of large canals is in many cases quite impracticable, in many others not economically practicable.

Marine navigation is the mode of navigation which notoriously presents the greatest combination of advantages. Besides the advantage of cheap haulage for low speeds offered by navigable water generally, the ocean offers a free road traversable in all directions, one on which it is possible to increase almost indefinitely the size of vessels, the size being limited mainly by accommodation available at ports and the dimensions of such canals as Suez and Panama. These advantages far outweigh a somewhat greater risk of loss at sea than on land from storms and other causes. It is in this mode of water carriage that the most important developments have taken place in modern times. These developments affect the size of the vessels employed, the range of navigation, the precision with which a course can be laid down and followed, and the power used for propulsion.

The navigation of the sea in small boats for trade purposes is not yet quite extinct. The islanders of the Pacific Ocean and the Eastern Archipelago undertake short voyages in a great variety of small boats, and some of the islanders in the trade-wind region of the Pacific regularly set out in fleets of small boats on long expeditions, in which they go far out of sight of land, guided only by the direction of the low waves which constantly prevail in these regions owing to the action of the steady wind. Such adventurous enterprises unaided by the modern appliances for navigation are, however, the exception. In ancient times the Phœnicians were the most adventurous seamen, at least in European waters. About 1000 years B.C. their vessels traversed the entire Mediterranean, and even went beyond the Pillars of Hercules (Straits of Gibraltar), possibly as far as the Scilly Isles, and about the beginning of the sixth century B.C. Phœnician seamen in the employment of Pharaoh Necho, King of Egypt, are credited with having made a voyage round Africa. But the most adventurous of their expeditions were mainly coasting voyages. Ancient writers of the first century A.D. mention as something recent the discovery of the use that could be made of the monsoon winds in sailing from the mouth of the Red Sea to India at one period of the year and back at another. It is

at least certain that a trade of this nature was regularly organised within that century, but even these voyages were probably not wholly on the high seas. Before the close of the Middle Ages, however, vessels sailed with the monsoons from the east coast of Africa direct to India and Ceylon.

In modern times ocean navigation has been greatly facilitated by the use of the mariner's compass. This instrument, there can be no doubt, was known to the Chinese at a much earlier date than to Europeans. So far as can be ascertained, it was first known in Europe towards the close of the twelfth century. The Neapolitan Flavio Gioja (with doubtful warrant) gets the credit of having improved it in the fourteenth century, and since then it has undergone a long series of improvements, especially in the nineteenth century, when the increasing use of iron in shipbuilding has rendered it necessary to devise methods for neutralising the disturbing effects of that metal on the compass needle. It was not till sailors became accustomed to this instrument that they became bolder in their ventures. The Portuguese voyages in the fifteenth century, which added greatly to the knowledge of the west of Africa, were still for the most part coasting expeditions. It was in the last decade of that century that Columbus discovered America (1492), and Vasco da Gama the sea-way to India (1497–98)—a discovery hardly less important in the history of commerce, on account of the effect it had on the fortunes of the great trading centres of Italy and southern Germany.

For hundreds of years after the first use of the compass in Europe mariners were still without the means of determining with precision their course on the high seas. Improved chronometers, almost as indispensable for this purpose as the compass, date only from 1736.

Steam navigation, by which so great a revolution has been effected in sea-carriage, originated, like steam railways, in the nineteenth century. Trials of steam-engines for the propulsion of vessels were, indeed, made before the end of the eighteenth century. But the patent for the first steamboat which proved a success, so far as locomotion was concerned, was taken out in 1801 by Symington, and a boat constructed on this patent had a few trials on the Forth and Clyde Canal. The first really successful steamboat voyage was that made in 1807 from New York to Albany on the Hudson in a vessel constructed by Fulton, who had worked independently on the problem of steam navigation since 1803. In 1819 a ship crossed the Atlantic using steam as an auxiliary, and in 1838 two ships sailing about the same time from Cork and Bristol respectively, made what are considered the first commercially successful steam-voyages across the Atlantic. In 1820 an iron vessel made a voyage from London to Paris, and in 1832 the first ocean-going

vessel, the *Elburkah*, made the voyage from Liverpool to the Niger. The subsequent history of shipping has shown a steady increase in the proportion of steam- to sailing-vessels in the shipping of the world, along with an ever-increasing use of iron and steel, at the expense of wood, in shipbuilding, until recently, when Diesel and motor vessels have tended to replace steam.

It was about the middle of last century that steamers began somewhat rapidly to displace sailing vessels, and in the 'sixties that iron came to be more and more substituted for wood as the building material. The invention of mild steel (p. 263) made it possible to use steel in place of iron, and this material was first made use of in the Cunard liner *Servia* in 1881. The great advantages of iron or steel vessels over wooden ones are their greater strength, endurance, and lightness in proportion to the load. Wooden vessels seldom lasted for more than 12–15 years, whereas the life of a steel vessel may exceed 40 years. The weight of a wooden ship was nearly as great as that of its cargo, whereas a steel vessel can carry a load of from two to four times its own weight; river steamers, which are not so strongly built, an even larger proportion. Formerly the proportion was greater in sailing vessels than in steamers, in which latter a large amount of room is required for the machinery and the fuel. This is one reason why the sailing vessel is still used for certain purposes. Especially during the War, the introduction of reinforced concrete, that is, concrete strengthened internally with steel rods, as a building material, and of fabricated ships had some influence on the local distribution of the shipbuilding industry. Concrete ships of upwards of 1,000 tons burden were constructed in large numbers during the War, when the saving of steel was important. Fabricated ships are made up of parts which may be manufactured like bridges, at inland steel works, and put together at the seaboard. This also was very largely a war development.

Here we should note the meaning of tonnage. Cargo tonnage refers normally to the actual weight of cargo carried expressed in long tons, 2,240 lbs., or short tons, 2,000 lbs. Actually, however, 40 cubic feet of cargo is normally reckoned as equivalent to 1 ton. The gross tonnage refers to space measurement, not to weight, 100 cubic feet being reckoned as 1 ton; gross tonnage is the capacity of the entire space between the frame of the vessel and the deck, together with any closed-in space above deck. Net or registered tonnage refers also to space measurement, but from the gross tonnage is deducted the space occupied by engines, gear, crew's quarters, and officers' quarters; it represents, indeed, the space available for cargo and passengers. Displacement tonnage refers to the weight of water actually displaced by the vessel when fully laden; it is really the weight of the vessel and its contents when fully laden.

There has also taken place a steady increase in the size and speed of vessels, especially passenger vessels, built for the great routes of commerce. The ships in which the great voyages of discovery were made in the fifteenth and sixteenth centuries were, according to our standard, very small. The largest of the three caravels with which Columbus discovered the New World was of only 100 tons burden. Frobisher effected his discoveries in 1576 with a ship of 25 tons and a pinnace of 10 tons, and Drake in 1577 set sail on his voyage round the world with five ships, of which the largest was only 100 tons. But we must not be misled by these figures as to the average dimensions of the merchant vessels of the period. Small vessels were often purposely chosen for voyages of discovery, as being better fitted for the exploration of unknown coasts. This is still true in Antarctic exploration. Even in the twelfth century, an average-sized merchantman in the Mediterranean appears to have had accommodation below deck for about 250 tons of cargo, besides a considerable cargo above deck. Nowadays, the average liner is of more than 10,000 tons burden; and so greatly has the speed been increased, that the average of such liners is from 12 to 16 knots or nautical miles per hour. The largest vessels yet built are the *Queen Mary* (73,000 tons) of the Cunard-White Star Line (British)—which is 1,018 feet long and carried out her maiden voyage in 1936—and the *Normandie* (80,000 tons) of the Compagnie Générale Transatlantique (French), 962 feet long, completed 1933. These exceed in size the old giants the *Majestic* (56,551 tons) of the White Star Line, the *Leviathan* (54,282 tons) of the U.S. Line, the *Berengaria*, formerly the *Imperator* (52,226 tons) of the Cunard Line. For 22 years the speed record was held by the liner *Mauretania*, which attained a speed of 26·6 knots, and made the voyage from Sandy Hook, New York, to Cobh, Ireland, in 4 days 14½ hours. In 1930 the Norddeutscher Lloyd *Bremen* on her maiden voyage set up a new record of 27·7 knots, exceeded a little later by her sister ship, the *Europa*, with 28 knots. Later the *Normandie* exceeded 30 knots for the crossing but the 'Blue Riband' of the Atlantic was wrested from her by the *Queen Mary* in 1936. Ordinary cargo steamers ('ocean tramps') of larger size are built with a cargo capacity (dead weight) of 5,000 to 9,000 tons, and to run at a speed of 10 to 11 knots.

The increase in the size of steamers has been a necessary result or condition of the increase of speed, but the more rapid rate of progress has been achieved, to a large extent, at the expense of an increased consumption of coal or oil; so that on a long voyage a large amount of space is required merely for the accommodation of the fuel. But the higher speed is not solely due to this cause. Improvements in the construction of marine engines have in some cases given increased speed with economy of fuel; and among

these improvements the most important is the invention of the tri-compound or triple-expansion marine engine, in which the steam is passed in succession into three cylinders, so as to act on three pistons and utilise its expansive force to the utmost. By such improvements the consumption of fuel had in 1897 been reduced since the early days of steam navigation from between 5 and 7 lbs. to about 2 lbs. per indicated horse-power per hour. In recent years the steam turbine has been applied almost universally in marine engines. In such engines the steam, instead of acting on opposite sides of a piston reciprocally, is made to impinge continuously on a series of blades fixed to a revolving drum. By such an engine a speed of upwards of 36 knots was attained on torpedo-destroyers in 1918. Here also may be noted the increasing use of oil-fuel and Diesel oil-engines in ocean steamers, and of petrol motors on inland waterways, as well as barges drawn by tugs at sea. In June 1920 two of the largest ocean-liners were equipped for the use of oil-fuel, for though oil is dearer than coal it presents in addition to other recommendations the great advantages at sea of requiring much less space (little more than half that required for coal), the getting rid of stokers and the consequent reduction of the crew by about 50 per cent., and a great reduction of the time required for replenishing the fuel supply. The British Navy has also largely been converted to oil-fuel, and many liners have followed suit. The proportion of motor-ships to steamers is rapidly increasing, especially in foreign countries. In 1924 the gross tonnage of motor vessels building was stated to be equal to $45\frac{1}{2}$ per cent. of the steamer tonnage, but those in British yards equal to only 35 per cent. of that of the steam vessels building. In 1929 the tonnage of motor ships building in the world was 56 per cent. of the total vessels under construction. In 1935 motor-ships represented 18 per cent. of the world's total tonnage; sailing-vessels rather under 2 per cent.

One consequence of all these improvements was in pre-War days the reduction of freights, and another is the increase in the size and depth of the harbours belonging to the great seaports, or the establishment of outer ports for the accommodation of vessels unable to reach older ports in the neighbourhood. While such changes are brought about, it is obvious that in the competition between different countries, a great advantage belongs to those which are rich in deep and capacious natural harbours, or such as require least outlay to adapt them to the requirements of the present day.

Another less obvious but very important consequence of the same improvements has been an incalculable increase in the security of sea voyages. This has been brought about in two ways. First, the large vessels and especially the large steamers of the present time are much less liable to be wrecked by storms than the smaller

vessels of past days. Second, it is the large modern steamer that has made it possible to sweep pirates away from the sea, a service for which the world is indebted chiefly to the British Navy and mercantile marine. People who are acquainted with only present conditions cannot but be astonished on learning of the losses that formerly took place on ocean voyages. Of the 86 ships sent to the East by the English East India Company in the first 21 years of its existence (1601–21) only 36 returned with cargoes, the others having been captured, lost, or become worn out. In the ten years 1590 to 1599, 33 large carracks left India for Europe, but of these only 16 reached Lisbon. On the route from India to Japan at that time we are told that out of nine starting on the three years' enterprise, only four might be expected to return. The average life of a carrack is given as apparently about three years. What is believed to be the oldest marine insurance policy in existence, dated February 1656 (1657 of our calendar year), shows a rate of 5 per cent. on a voyage from Macassar or Bantam to London.

Ocean Trade Routes.—Goods are conveyed by sea from any seaport from which it is possible to obtain goods which can be sold at a profit elsewhere. But the route by which the goods are conveyed to their ultimate destination depends on many circumstances, some connected with the nature of the commodities, some with the type of vessel used, and all, of course, connected with the relative situation of the place of origin and the destination of the commodities.

To understand how the nature of the commodities carried affects the route, two important considerations must be borne in mind. First, it causes expense to transfer goods from one vehicle (whether ship, railway wagon, or cart) to another. It is therefore an advantage to convey goods directly from the port which serves the district where the goods are obtained to that which serves the district in which they are ultimately sold. But, second, it is cheapest to convey goods in the largest possible vessels, provided that those vessels can be filled. This frequently makes it cheaper on the whole to incur extra costs in unloading and reloading (handling expenses), and send goods first in smaller quantities to a great port, from which they are sent in large vessels to another great port, from which again they may be sent by sea to some other port nearer their final destination.

It is bulky goods, and especially such as involve great labour in handling, like coal, timber, ores, and clays, that are most likely to be carried direct, for the quantity of such goods that may be required in a small district may be enough to fill a larger or smaller ship, and thus bring about the greatest possible saving in handling. That is why so many small British and Irish seaports import timber directly from abroad, why so many British seaports export coal

sometimes in small vessels, why so many small foreign seaports receive British coal, and why small ports in Cornwall and Devon send off entire cargoes of China and other clay. Such bulky commodities as these are often useful as return or ballast cargoes, helping to reduce the freight charge in one direction by forming the whole or part of a cargo in the opposite direction. The importance of coal to British commerce in this way has often been emphasised, but salt, cement, clays, and even bricks also aid British commerce in the same way. China clay sometimes serves as a return cargo from England even to the United States. Though in value bricks form an absolutely insignificant article of export from the United Kingdom, the weight of bricks annually exported before the War was probably one-fourth or one-fifth of the weight of cotton piece goods exported. It was return cargoes of wood-pulp and other timber products that favoured the temporary rise after the War of an export trade in coal from the United States to Sweden. Such considerations give much interest and significance to the table given below (p. 359) showing the price per ton of a large number of British imports and exports.

On the other hand, the economy of carrying in large ships explains why tea, coffee, spices, and other commodities sent from the East to the United Kingdom come almost entirely first to London, it may be in ships that are largely filled with bulky commodities. Of all these commodities much greater quantities are used in London itself than in any other centre of the country; but great quantities are also sent away by rail from London, and great quantities by sea to both British and foreign ports with which London carries on a regular trade. The daily shipping reports show how many ships come to the large ports laden with 'general cargoes,' that is, cargoes composed of many kinds of goods brought together to get the advantage of carriage in large ships. Naturally, most 'liners' which run to definite schedules, on definite routes, carry general cargoes. 'Tramps,' on the other hand, tend to specialise in bulk cargoes. It is estimated that liners now handle 80 per cent. of the total ocean traffic.

It is obvious that the advantage of carrying in large ships will be the greater the longer the distance that goods are so carried. That is one way in which the relation of the place of origin to the destination of goods affects the route followed. It is one reason why the Eastern goods mentioned come chiefly to London in the first instance, and also the reason why the bulk of Australasian and Cape wool imported into England comes first to London, even though not a pound of it is worked up there, but all has to be sent away again either to Bradford or some other town at home or to foreign countries.

Then, again, the nature of the commodities may affect the

route. Perishable goods, like fresh meat, vegetables, fruit and flowers, butter and eggs, and goods of high value in proportion to their bulk, like mails, and smaller but valuable manufactured goods, are taken by the quickest routes in spite of the increased cost per mile, and may often be transferred from sea to land, and then again from land to sea if necessary, for the sake of speed.

The goods for which sailing-vessels are still sometimes used are those bulky goods which have already been instanced as likely to make up whole cargoes. The rapid decline in the number and tonnage of sailing-ships of 100 tons and upward in recent years is well seen from the following table :—

	Number.			Millions of Tons.		
	1900.	1910.	1935.	1900.	1910.	1935.
Steam and Motor World Total	15,898	22,008	29,071	22·4	37·3	63·7
Sailing World Total . .	12,524	8,050	1,908	6·7	4·6	1·1
Steam and Motor, U.K. .	7,930	9,837	9,169[1]	12·1	18·1	17·3
Sailing, U.K.	2,908	1,658	663[1]	2·1	1·0	0·2

Now that ocean routes depend so entirely on other factors, it is of interest to record how winds and currents formerly were of paramount importance. A vessel taking the outward route from the English Channel to New Zealand kept well to the east of the Azores so as not to have south-westerlies as head-winds and so as to get the benefit of the north-east Trades as soon as possible. After crossing the belt of calms and variable winds the vessel made for the coast of South America, at first at right angles to the south-east Trades, and afterwards, from about 21° S., getting the benefit of the winds that circulate the 'horse latitudes' of the South Atlantic. These winds, blowing, in the west of the area referred to, from about 20° to 30° or 35° S., parallel to the coast of South America, ultimately brought the vessel to the 'roaring forties,' which carried her steadily eastwards south of the Cape of Good Hope and Tasmania to New Zealand. On the homeward voyage the same winds carried the vessel south of Cape Horn, after which the vessel stood well out to sea and sailed northward through the middle of the Atlantic more or less obliquely to both trade-winds, and, keeping well to the west of the Azores, had a good chance of favourable winds up the Straits of Dover in the region of the prevailing south-westerlies. Reference may be made to former editions of this work for a folding map and other details of the routes of sailing-vessels.

Steamer routes are almost independent of winds and currents. Where practicable, the shortest route from port to port is adopted by steamers, and that is a route following an arc of a great circle of the earth, in other words, a circle of which the centre of the earth is the centre. Hence, where the route is from north to south or the reverse a meridian is followed, but where the route is from east to

[1] British Empire.

west it is only on the equator that the route lies along a parallel of latitude. As these parallels become shorter and shorter towards the poles, the shortest of great circle routes deviate more and more from the parallels as the poles are approached. The farther north an east to west route lies in the northern hemisphere the more will it curve towards the north from the parallel connecting places at the ends of the route; in the opposite hemisphere the more will it curve to the south as one nears the south pole. In the northern hemisphere, if the route is to a port lying north-east of the starting-point, the great circle route will be represented on a map drawn on Mercator's projection[1] by a curved line lying to the north-west of the straight line connecting the starting-point with the destination; if the course is from north-west to south-east, the curve will lie to the north-east of the line joining the two ends. If the course is from south-west to north-east in the southern hemisphere the curve on the map will lie to the south-east, and if from north-west to south-east it will lie to the south-west of the respective straight lines joining the points of departure and arrival.

It is only on a globe that great circle routes can be at once seen and measured. This is done by means of a flexible strip of brass called a quadrant, marked in degrees of the earth's equator according to the scale of the globe for which it is constructed. Each degree represents 60 nautical miles,[2] the unit in which ocean distances are usually stated.

To take great circle courses, however, is not always practicable. The relations of sea and land may prevent it, and so also may the character of the climate. For example, the great circle route from Cape Town to Wellington, New Zealand, goes to the south of the Antarctic Circle, and for that reason a more northerly though longer route is preferred.

Among frequented ocean routes those in which great circle sailing causes the most marked deviation from the parallels of latitude are those of the North Pacific, where very wide stretches of ocean have to be crossed between the ports of North America and those of eastern Asia. Yokohama is in a more southerly latitude than San Francisco, yet a steamer sailing for Yokohama from San Francisco begins by sailing north-westwards, and describes a curve which rises to about 48° N. The route from Vancouver or Puget Sound to Yokohama passes just south of the Aleutian Islands. In the narrower waters of the North Atlantic the rise of the east-west great circle routes to the north of the parallels is not so striking, especially since Newfoundland lies in the way on any great circle

[1] Mercator's is the only projection on which all directions referred to points of the compass are shown by straight lines. That is why this projection is nearly always used for marine charts.

[2] One nautical mile = 1·1507 statute mile.

from the south of Ireland to any American port north of Cape Hatteras. The trend of the coast-line south of that cape is almost on the line of a great circle passing thence to the south of Ireland, and hence it happens that the routes from all American ports from Nova Scotia to the Gulf of Mexico are almost identical from about the meridian of 60° W. eastwards to the English Channel, and this is accordingly the busiest tract of the ocean. On the busy tracts of the Trans-Atlantic traffic, Atlantic lanes, as they are called, are prescribed for the sake of safety for east and west bound vessels respectively, varying according to the period of the year.

In some cases the route is slightly modified by the position of coaling-stations or oiling-bases. Next to the North Atlantic route, the most frequented is that through the Suez Canal, which is the meeting-place of all European and North Atlantic lines to East Africa and the Far East, and most of those of Australia and New Zealand. The part from the Straits of Gibraltar to the mouth of the Gulf of Aden is common to most of the lines following these routes. On this section the chief coaling-stations are Gibraltar, Marseilles, Algiers, Port Said, and Aden. These coaling-stations are also great *entrepôts*. At Gibraltar and Port Said many goods are landed by vessels entering the Mediterranean from the west or east respectively for ports of the Mediterranean or the Black Sea, at which the vessels landing the goods do not call. Aden is a place at which goods for East Africa can be dropped by steamers belonging to eastern Asiatic and Australasian lines, and goods from East Africa can be picked up by steamers of the same lines. Colombo is the coaling-station and *entrepôt* where the lines diverge that pass round the south of Australia. Singapore is the chief coaling-station and *entrepôt*, and Batavia a minor but still important port for vessels going farther east, and at one or other of these the lines diverge that go round the north of Australia. The main route to the east continues on to Hong Kong, Shanghai, Nagasaki, and Yokohama, all great coaling-stations and the first two great *entrepôts*, Hong-Kong for southern China, and Shanghai for the Yangtse valley and northern China. Important branch lines proceed from Singapore to the ports of Indo-China, to North Borneo and to Manila in the Philippine Islands.

In the North Atlantic Ocean, Las Palmas, Tenerife, and Madeira are important ports of call both on the route to Cape Town and that to all the South American ports south of Cape St. Roque. Norfolk, on the coast of Virginia, a place of shipment of the excellent steam-coal of the Pocahontas coal-field, distant about 400 miles by rail, is a place frequently visited for coal by vessels returning from the Gulf of Mexico to the English Channel or the Irish Sea ; and since the opening of the Panama Canal the adjacent port of Newport News has become a great coaling-place on that route. St. Thomas

and St. Lucia in the West Indies are coaling-stations visited on routes from North to South America or from Europe to Central and the north of South America, and St. Michael in the Azores may serve the same purpose both for steamers plying between north-western Europe and the West Indies and between North America and the Mediterranean.

In the South Atlantic the chief coaling- and oiling-stations are Cape Town and Buenos Aires, the latter obtaining its steam-coal largely from Cardiff. On the American seaboard of the Pacific the great coaling-station between San Francisco and Concepcion Bay in Chile, where coal-mines exist close to the sea, is Bilbao at the entrance to the Panama Canal. Honolulu is a coaling-station on the routes from western North America to Australia and New Zealand, and Durban is of importance on the Indian Ocean.

Aerial Transport has been the most striking development of the early years of the twentieth century, having been greatly promoted by the invention of the petrol engine. This engine is now used both on aeroplanes, which are machines heavier than air with rigid wings, and airships or dirigibles, whose buoyancy depends, like that of ordinary balloons, on the lightness of hydrogen or other gas. The general term aeroplane may be held to include seaplanes, hydroplanes and flying boats, designed for landing on water. Aeroplanes have been increasing in size and weight, those of Imperial Airways London to Paris service weigh 13½ tons loaded, load being about 20 per cent. Airships are essentially of considerable size and may remain in the air for more than four days at a time. Aeroplanes ordinarily fly at heights up to 10,000 feet—ascents to over 30,000 feet have been made—and have attained speeds of over 400 miles an hour, but the speed diminishes greatly as the load is increased and the ordinary cruising speed for mail and passenger services is 150 to 200 miles per hour.

The English Channel was first crossed by a heavier than air machine only in 1910. Both aeroplanes and airships developed rapidly and became only too familiar through their use and abuse during the Great War. The dirigible or airship developed naturally from the balloon but has proved of limited use. The Zeppelin, named after its designer Count Zeppelin, achieved notoriety and a certain success during the War. The British R34 crossed and recrossed the Atlantic successfully in 1919, and a British-built commercial airship with a nominal lift of more than 60 tons, and a speed of 50 miles an hour, and a range estimated at more than 4,000 miles, was completed in 1921, but destroyed by fire during flight the same year. In May 1924 the Air Ministry started on an extensive scheme for lighter than air research and experiment. This was carried on until the disaster to the R101 in October 1930 and then virtually abandoned. Similar disasters in America led to the same action.

Only Germany has persisted and with the Graf Zeppelin established a regular mail and passenger service to South America.

On the other hand, the heavier-than-air machine is firmly established in modern life. For short journeys they scarcely compete with railways, but on stages of 400 miles and upwards, or even shorter stages involving a sea crossing, they have an accepted place for passengers and mail. In December 1918 an aeroplane flew from Cairo to Delhi, a distance of 3,200 miles, in 47 hours 20 minutes, collecting and delivering mails on the way. Regular international services were soon established.

Before the end of 1920 there were regular commercial air services between the chief centres of central and western Europe—from London to Paris, Brussels, and Amsterdam ; from Paris and Berlin, radiating in various directions, from Bordeaux, on the one hand, to Nice, on the other hand, to Barcelona, Alicante, Malaga, and Rabat in Morocco. A 30-hour San Francisco–New York service was set up on July 1, 1924, along a route marked by beacon lights at night every three miles. An Imperial Air Route from England to India was inaugurated by a successful return flight commenced in December 1926. Successful trial flights were made in 1925–26 from England to South Africa and from England to Australia ; a regular service to South Africa was inaugurated in January 1932. There followed the inauguration of services to Australia, whilst American services linked up all the larger towns of both North and South America. A regular trans-Atlantic service is planned for 1938.

Handling.—A serious element in the cost of transport is what comes under the head of handling or the transference of the goods from one means of transport to another, or to the place where they are required by the purchaser. So greatly has the cost of transport been cheapened that in some cases the final handling is dearer than the carriage of the goods for great distances. It has been stated that a ton of coal is carried the thousand miles from Buffalo to Duluth for about the cost of shovelling it from the side-walk into the cellar. It is these handling charges together with the cost of the delivery of goods to the customer or the collection of goods from the customer by cart or motor-wagon, that make up the terminal charges of British railway companies and which in certain cases form a very high proportion of the total freight rate. The importance of avoiding numerous handlings of commodities in the course of transport thus becomes obvious. Before the opening of the Panama Canal it was necessary for the goods to be loaded and unloaded six times between New York and the wharves at Guayaquil on the coast of Ecuador. The general tendency of the modern developments of transport has been to reduce the number of such handlings and to introduce more economical methods. The fact

that railways, on which the same wagon may be sent over thousands of miles on interconnected lines, reduce the necessity for handlings has already been implicitly referred to as one of the great advantages of this means of transport. Among modern methods of handling may be mentioned the use of large grabs or mechanical shovels capable of lifting ten tons at a time, the equipment of wharves and railway sidings with powerful cranes worked by electric motors, the use of endless bands for the horizontal transmission of commodities like grain from warehouses to ships, and of bands or chains provided with hooks or other holders for lifting. Large truckloads of coal and other commodities can be emptied through shoots into the holds of vessels, and it is possible to load a vessel of nearly 10,000 tons with iron ore in 20 minutes. On the Aire and Calder Canal trains of boats containing coal for export at Goole are made in sections of 35 tons, and each section is lifted separately and emptied at once of its contents. It is one of the advantages of grain that it can be handled like water, so that it can be sucked up from the holds of vessels. Other illustrations of the modern simplifications in the handling of special commodities will be found under Wheat (p. 119), Petroleum (p. 246), and Sugar (p. 196).

POSTS AND TELEGRAPHS. Cheap postage is another of the gains to commerce that have accrued since 1800. The penny post was introduced in the United Kingdom in 1840; the International Postal Union owed its foundation to a conference held at Berne in 1874. The practical use of the electric telegraph dates only from 1846 (more than twenty years later than the introduction of steam railways), but the apparatus necessary for their working is so much less costly than that of railways that the spread of the electric telegraph over the world has been even more rapid than the use of steam for locomotion. The first message through a submarine cable (between the South Foreland and the coast of France) was sent on November 13, 1851. In 1866 was laid the first permanently successful submarine cable across the Atlantic Ocean. Since the completion of the cable from Vancouver by way of Fanning, Fiji, and Norfolk Islands to New Zealand and Australia in 1902, all the oceans have their opposite sides connected by this means. Communication by wireless telegraphy on the Marconi system was established between the Lizard, in Cornwall, and the Isle of Wight, a distance of 200 miles, in January 1901, and in 1907 regular communication by the same means was established between Clifden, County Galway, Ireland, and Glace Bay, Nova Scotia. On March 1, 1920, one between Carnarvon in Wales and Belmar, N.J., U.S.A., was begun. Now all large and most small vessels, airships, and some aeroplanes are provided with wireless apparatus, and wireless stations are now constructed capable of communicating with all parts of the world. The telephone first became

known in its present form at the Philadelphia Exhibition in 1876. Since 1914 rapid progress has been made with wireless-telephony, and by 1919 this was associated with direction-finding apparatus, making it possible for ships to ascertain their positions at sea, by taking bearings on shore wireless stations. In the following year it was so far developed that songs could be heard quite distinctly more than two thousand miles away. The first wireless conversation between London and the United States was held on January 15, 1923. Regular telephonic communication was established early in 1927. It would be difficult to exaggerate the importance of broadcasting information and news by wireless, which is now general in all the more important civilised countries. The effect is most marked in the less accessible portions of regions like Australia and Rhodesia where individual farms may be separated by a score of miles and which formerly received a newspaper perhaps once a week or once a month, but which are now in instantaneous communication with the great centres. A still more recent development in wireless is the beam system whereby messages, instead of being broadcast, can be projected in a definite direction. The beam system was used between England and Canada in 1926.

COMMERCIAL AND INDUSTRIAL TOWNS. Clearly there are certain places in which it is most convenient for the exchange of commodities on a great scale to take place. These are great business centres, commercial towns; and the situation of these towns in many cases shows that there are special conveniences for exchange that have favoured their rise and growth. All towns are more or less centres of exchange. Whatever else they may be, they are places where stores of goods in common request are kept, so that the inhabitants of the district around may be able to supply themselves with these when they wish. But in order that a town may grow up to be a great business centre it must have special advantages of one kind or another for the exchange of goods or a certain class of goods.

These advantages may be of very various kinds. The mere fact that a town lies about the middle of a densely peopled district is likely to make it in many cases the most convenient place of exchange for the products of that district and the articles brought from more distant parts to be used within it. Hither are brought in large quantity the various products from the parts in which they most abound, and hence they are sent out again in smaller quantities, along with quantities of other kinds of goods, to the parts in which they are required.

So, too, towns that are situated where the form of the surface in the country round about causes a number of roads to converge are likely to grow up into more or less important business centres. If a town is situated in a more or less open expanse enclosed by

hilly country through which valleys have allowed roads to be made in different directions, it will naturally be the centre of business for the districts to which these roads lead, and its importance as such will probably be in proportion to the productiveness of the surrounding regions. Since from a level country roads will naturally converge towards passes which lead over hills or mountains, towns are apt to arise, in such situations, at the meeting of hill and plain. In like manner, many towns have grown up at spots where for any reason there was a convenient crossing-place on a river by ford or bridge, and many others exist at the confluence of navigable rivers at marked bends on rivers, or where the superficial configuration leads to the convergence of numerous railways, as at Chicago, Toronto, Winnipeg, or Atlanta.

Business towns likewise spring up in many situations in which the circumstances necessitate a change in the mode of carriage. Of this class of towns, seaports are the most numerous examples. Where goods have to be transferred from any mode of land carriage to ships, there must necessarily be a town to accommodate those engaged in this transfer. Hence it is that so many of the large towns of the world are seaports, the relative importance of which depends chiefly on the productiveness and accessibility of the regions served by them, or, in a single word, of their hinterlands, and the facilities which they afford to shipping.

The term hinterland is one that may be used both with reference to a single seaport and to a seaboard on which there are several seaports, and may be defined as the land which lies behind a seaport or a seaboard, and supplies the bulk of the exports, and in which are distributed the bulk of the imports of that seaport or seaboard, either generally or in relation to certain uses. The necessity for the first clause in this definition arises from the way in which the outline of the land sometimes determines the port with which an inland region communicates in its relations with different parts of the world. Thus the West Riding of Yorkshire may be included in the hinterland of Liverpool for Irish and even a considerable amount of trans-Atlantic trade, but for North Sea trade it obviously belongs to the hinterland of Hull, Goole, or Grimsby. The Elbe basin forms the chief part of the hinterland of Hamburg in relation to all North Sea and oceanic traffic, but is included in that of Lübeck in relation to the Baltic. Toulouse belongs to the hinterland of Bordeaux for all traffic except that of the Mediterranean, for which it would naturally make use of Cette or even of Marseilles.

The word, in its German form *hinterland*, seems to have been introduced into English about 1884, in connection with the discussions that arose on the occupation of parts of the West African coast. It came at once into general use from the fact of its meeting an obvious requirement. The use of the anglicised form 'hinder-

land' has not become general. The confusion caused by a connection of the word with 'hinder' and 'hindrance' must not be overlooked. A later extension of hinterland has been to include the land tributary to an urban centre, independently of whether that urban centre is a port.

From some of the examples just given, it will be observed that the hinterlands of different ports may overlap even in relation to the same seas. This arises from the influence on a seaport of shipping facilities and facilities for communication with the hinterland. The hinterlands of Hull and Goole to a large extent coincide, but where the economy of transport effected by the use of large ships is the chief consideration, Hull will be preferred on account of the superior facilities for shipping there afforded, but where smaller vessels serve the requirements of a particular trade, Goole may and probably will have the preference in consequence of being nearer the hinterland. The trade of Quebec may encroach on the hinterland of Montreal, but its distance from that hinterland will prevent it from doing so except in the case of such traffic as is greatly promoted by rapidity of transit, such as passenger traffic, and traffic in the more perishable, or more valuable and less bulky commodities. Trade rivalries and the nature of the internal means of communication also affect the competition of ports in the same hinterland, as in the case of Grimsby and Hull. Lastly, it should be pointed out on this head that the extent and importance of a hinterland may be greatly increased by improvements in the means of internal communication, by improvements in the port itself and particularly by adjustment of inland freight rates.

The frequent necessity for change in the mode of carriage also helps to explain why many towns have grown up at the foot of pass-roads, and the same circumstance likewise explains the precise situation of many towns situated on rivers. Many such towns are situated, or were founded, at the highest point to which rivers could be navigated, or could be ascended by vessels of a certain size; many, where a rapid hinders, or a fall prevents, further navigation. To one or other such points goods are, or were formerly, conveyed by boats, and a town sprang up where they were landed. Other towns on navigable rivers are situated where there is a sudden change in the direction of the stream, because at that point goods had to be landed which were not intended to follow the new direction taken by the river. Even where the navigation of rivers has ceased to be important, the study of navigable rivers must have a permanent place in economic geography on account of their having determined the original sites of towns, where subsequent growth is due to other causes, in a large measure to the provision of other means of communication. It has been said by Moulton that the location of every city of importance in the eastern part of the United

States, with the single exception of Indianapolis, was determined by the possibilities of water transport.

Since the development of machinery, many large towns have sprung up where there is abundance of coal, or coal and iron, or extensive water-power, the mainsprings of modern industry; and all such towns are more or less business centres. Yet they are often far from being business centres in proportion to the extent of their production. Where numerous manufacturing towns exist on a great coal-field the business of exchange may be centred in one of them that is not pre-eminently itself a manufacturing town. The great magnitude of the business of exchange in such a region is adverse to the carrying on of manufactures in its business centre, for the cost of land, owing to the requirements of merchants and others for offices, &c., becomes so great that it is too expensive to erect large factories. Hence it is that Manchester, in which, according to the estimate of a local manufacturer, is sold probably three-fourths of the cotton-yarn spun, and even a larger proportion of the cotton cloth woven in the United Kingdom, is less of a manufacturing town than many of the smaller towns round about.

What has just been said makes it clear that a variety of influences must be kept in mind as affecting the localisation of industry. These work in combination, in some cases one or two of them having the chief efficacy, in others another group, and unfortunately neither individually nor in association is it possible to measure them. The main localising influences may be considered under the heads of the market, the labour supply, the cost of land, the situation of raw material, the nature and situation of the sources of power, the value of the commodities produced in relation to the cost of the various items entering into their production, and finally the supply of capital.

In connection with influences coming under any of the heads enumerated, two general facts are worthy of note. First, the psychological action of the sense of opportunity as a stimulus to exertion can hardly be exaggerated. 'What is wanted,' says Bertrand Russell, 'in order to keep men full of vitality is opportunity, not only security.' Marshall remarked 'that a man's energies are at their best when he is emerging from poverty and distress into the command of great opportunities.' It is the great function of capital to create opportunities, but economic development is likely to be most rapid where opportunities are most obvious and easiest to turn to account. The second general fact referred to is that great economies can always be effected where it is profitable to work on a large scale, though that does not imply that there are no economies peculiar to small-scale production.

It is obvious that the profitableness of large-scale operations must depend on the adequacy of the market, which again is governed

by various conditions as (1) The number of people where the industry is carried on; (2) The purchasing power of the people, a great contrast in this respect being presented by China, India, and Africa as compared with Canada, the United States, and other new countries, in which latter the purchasing power is enhanced by the diffusion of education; and probably still more by the extent of the undeveloped resources; (3) The nature of the commodity for which a market is sought—cheap goods for peoples of small purchasing power, more valuable commodities for regions in which individual wealth is greater; (4) Facilities for transport as enlarging the range of the market. Here it may be noted that the aim of a protective or preferential tariff is to preserve a large home market for the favoured industry or industries. Where the protection afforded is absolute, the whole country embraced by the tariff forms a local market for the protected industry.

As to labour reference should be made to what has already been said (p. 63), but we may note further that much depends on the opportunity for organising labour, and that while abundant labour necessarily involves the presence of a more or less important market, the degree of its importance must vary in proportion to the purchasing power of the labourers. The cost of land is another fact intimately related to the value of the market as influenced by populousness and purchasing power. Further, a dense population is a great advantage in all matters involving mutual aid. This advantage is usually paid for when a high price is given for land. The consideration as to the value of commodities is intimately connected with that as to labour organisation. Industries concerned with the manufacture of very valuable products of highly skilled labour, such as calculating machines, typewriters, electrical apparatus, &c., may be carried on with advantage in any of a thousand places in a fairly populous region furnishing a large part of the demand, but in such a region the spots affording the greatest facility for distribution will naturally be selected. The supply of capital is another item more or less related to the number of the population, but far from being directly proportioned to its density. On the sources of power see, besides the paragraphs just mentioned, those dealing with petroleum and other oil-fuels (p. 246), industrial alcohol (p. 289), and falling water, together with electricity as an agent in the distribution and application of power (p. 71).

The influence of coal in promoting the growth of towns has been both direct and indirect. If the mines are large and numerous in one locality, the population of miners with their dependants and the shop-keepers required to supply their wants will form a considerable town, but this population is generally increased more or less by the industries to which the presence of the coal gives rise. It is evident, however, from a consideration of the facts of industrial distribution

in different parts of the world that the influence of coal in attracting industries to the coal-fields varies in different circumstances. The great coal-fields of England and Scotland, of Germany, Belgium, and the north of France have all become seats of varied industry, but in the United States, the greatest coal-producing country in the world, most of the manufacturing towns lie hundreds of miles away from the coal-mines, even where the power which they use is now mainly derived from coal, and some of the leading textile manufacturing towns of both Germany and France are also at a great distance from the mines.

To understand the very powerful influence that coal has had in attracting manufacturers to the place of its production, one must bear in mind one broad fact to which attention has been called, that raw materials tend to attach industries to their place of production in inverse proportion to the amount of the raw material that enters into the final product. A raw material which enters wholly into the manufactured product without leaving any waste can in itself, that is, apart from other favouring circumstances, have little effect in planting an industry where the raw material is found or produced, except where the intrinsic value of a heavy or bulky raw material is extremely small. This is true, however, not only of original raw material but also of such half-manufactured raw materials as are not more bulky and expensive to transport than the materials from which they are made. It is true, for example, of pig-iron and steel blooms and billets, which can be so freely sent great distances both by land and sea to feed the higher branches of the iron industry carried on where other conditions may be more favourable. Conversely, the presence of a raw material of which a large proportion is waste has a tendency to attract the industry making use of it to the material, or at least those stages of the industry which are necessary to get rid of the great bulk of the waste. Hence it is that a large variety of timber products are made by local sawmills in the neighbourhood of the forests from which the timber is obtained, that pulp-wood is locally made into wood-pulp and even paper, tanning and dyeing extracts made locally from wood and bark, sugar generally locally manufactured at least to the stage of 'raw' sugar, coconut kernels dried into copra, cacao beans extracted and dried, metallic ores partially refined on the spot into mattes, and so on. Now when coal is used as fuel, and that is its principal use, no part of the coal enters into the finished product, so that, if it has to be transported, the cost of carriage is an extra which would be wholly saved if the industry for which it is dispatched could be carried on with advantage where the coal is produced, an extra which is all the more serious on account of the great bulk of coal in proportion to its value. True, the tendency of coal to localise industries from this cause may be counteracted by other localising

influences, and has been greatly lessened in recent years by the *indirect* use of the coal as carbo-electricity. As a striking illustration of the way in which some of the advantages just mentioned may combine to localise an industry away from the coal even where coal is used in large amount, one may take brick-making as carried on on a very large scale at Peterborough, England. The raw materials are clay, water, and coal. Neither the water nor the coal enters into the final product, but the clay does so wholly, yet the industry is carried on where the clay, not the coal, is found. But brick-fields cover a great extent of ground, and it would probably be difficult to find land as cheap on the coal-fields as that where the clay lies, and, what is more important, to carry the clay to any coal-field would be carrying it farther away from the great market for the bricks, namely London.

On p. 244 a statement is given of the relative estimated proportion of coal used for different purposes in the United Kingdom, Germany, and the United States. The large proportion consumed in the iron and other metal industries is striking. The heaviest consumption is in the blast-furnace and in the making of mild steel and ingot iron, and it is hence natural that these industries should be specially attracted to the coal-fields. It is these industries that form the chief exception to the general rule in the United States that the manufacturing towns are not on the coal-fields. Yet, even in the smelting of iron, it sometimes happens that the transport is in the other direction, the ore being carried to the coal. In some cases so little of the ore enters into the raw iron that there is less waste of haulage in bringing the coal to the ore, especially if the limestone, another material required in smelting as a flux, no part of which enters into the product, is more conveniently accessible from the coal deposits. In other cases the advantage of using the means of transport in both directions, instead of having in one direction empty railway wagons or ships in ballast, leads to a reciprocal trade with a smelting industry at both ends. Sometimes again all three raw materials are collected at some convenient point in relation to the transport of the materials, the labour supply, and the means of distribution of the product, as at Middlesbrough in England, and Buffalo, Cleveland, South Chicago, Gary, and Duluth on the great lakes of America.

Among finished articles using steel without waste of the raw material, rails and structural steel in particular may be mentioned as manufactured very extensively where the steel is produced, but this is because these are industries that benefit largely by large-scale organisation as well as through the economy arising from using the steel before it has lost the heat given to it in the process of manufacture. Still, the increase in bulk in structural steel adds so much to its cost of transport that it is usually found advantageous to

carry on this industry near tide-water or even near a very large market in spite of the local lack of both coal and iron. The bulkier the final product and the more skilled labour counts for in its production, the less powerful is coal as a factor in determining the seat of an industry, and in such cases the tendency is for the industry to be carried on in the vicinity of the principal market or markets. It is for these reasons that the manufacture of agricultural implements is largely carried on in agricultural districts, as in the east of England and the north-west of America. The large areas required for the plant in these industries, and indeed for many modern industrial plants with their 'horizontal' layout, are another reason for their deserting the more crowded industrial centres. In the textile industries, if other conditions are equal, the advantages of local coal (or water-power) may be decisive provided the local supplies of soft water are good, but there are abundant examples to show that these industries also are easily deflected from the source of power.

Where the advantage of local coal is the main cause or one of the main causes of establishing industries employing a good deal of labour, other industries to which cheap coal is not of such vital importance may be set up in the same places on account of the labour supply thus afforded. The contiguity of various industries favours all of them in so far as it facilitates the shifting of the workers from industry to industry, or at least from one branch of an industry to another, according to the vicissitudes of trade. Further light industries using female labour often grow up side by side with heavy industries using male labour, or in areas where the male labour is otherwise employed, *e.g.* in ports.

Central stations for the generation of electric power by coal or central gasworks for the manufacture of gas from coal have become very numerous in recent years, and are now greatly encouraging the dispersal of industries.

All the circumstances mentioned above are manifestly subject to change, and so contribute to fluctuations in industry and commerce. Markets may become more valuable through increase in population or the development of resources previously unused, by improvement in the means of transport, and in other ways. The supply of labour, both skilled and unskilled, may be changed by migration, that of skilled labour locally increased by education and experience. Capital, where scanty and dear in proportion to the undeveloped resources, may be cheapened by local accumulation, by increase in security, or by increasing knowledge in the investing countries of the security actually afforded. In the case of primary raw produce an important distinction must be made between those products which are completely or economically exhaustible, such as minerals and natural fertilisers worked like minerals, and those

which can be reproduced indefinitely; and among those again the distinction must be kept in mind between those which can be reproduced annually or even several times in a season (such as clover, alfalfa, &c.), and those which can be reproduced only at intervals of years, sometimes prolonged intervals, like timber and pulp-wood trees.

As already indicated, the prosperity and relative importance of towns at the present day are in many instances due to other circumstances than those which determined their original situation and favoured their early growth. The very fact that a town exists and has attained a moderate size makes it a more or less convenient centre of exchange, and hence may make it worth while to increase its facilities for this purpose. Growing up, in the first place, it may be, at a point to which roads naturally converged, it became of sufficient importance to have new roads made from it. So in modern times railways have been made to towns because the towns already existed; and now the prosperity of the town is determined by the railways. In many cases the introduction of railways has favoured some towns at the expense of others, which may before their introduction have had a more favourable site. But the importance of such natural advantages as have been pointed out above is still to be seen in situations where towns grow up in new countries. In the older countries what may be called geographical inertia (not leading to change) or geographical momentum are significant.

The great business centres of the present day in populous countries fully provided with the modern means of transport are places in which the staple commodities can be procured at any time, in any quantity in which they are likely to be wanted; but it was different in former times, and is still different in less populous and less commercially developed countries. In the latter countries it is still the custom, as it once was more generally, to hold periodical fairs at certain places at stated times. At these fairs merchants congregate from a greater or less area around, in proportion to the importance of the transactions carried on, and the local dealers, in a single journey to the great market, supply themselves with all they are likely to want till the next fair. The places chosen for fairs are naturally, in many cases, such as present peculiar facilities for communication in several directions. In eastern countries, great fairs are often at the same time great religious festivals, as at Mecca in Arabia, Allahabad and Hardwār in India, and the place of the fair is determined chiefly on religious grounds.

The advantages of fairs held periodically are by no means without significance in the modern world. An excellent example of the resuscitation of fairs is seen in the British Industries Fair, now held annually in London and Birmingham, and which is open, during the normal hours of business, to trade buyers only.

The pilgrimages to Mecca, which form so important a feature of the Mohammedan religion, may here be specially noticed. All Mohammedans, poor or rich, are enjoined by their religion to proceed at least once in their lives to the sacred city of Mecca. The poor live by the way on alms, but most of those who are better off take with them all their possessions, thinking them well spent in accomplishing this object of devotion, or, if they are rich enough to have goods to spare at the end of their journey, hoping to increase their wealth by trade, which the more fortunate of them all the more easily do, since thousands of pilgrims are compelled to part with all that they have left for whatever they can get. In certain cases these pilgrimages have been of use in introducing the products of one region into another. The Arabian coffee-plant, for example, is said to have been introduced into southern India by a pilgrim on his return home.

COMMERCIAL COUNTRIES. The facilities for exchange that have given to certain towns a high degree of importance as business centres have during certain periods secured a peculiarly commanding position in the commerce of the world for different countries. One of the chief advantages for holding such a position lies in occupying a central situation between the regions with which the great commerce of the world is carried on. In the Middle Ages the most valuable commerce was that between eastern Asia and Europe; and as long as this was carried on through western Asia or by the Red Sea, Italy had peculiar advantages for securing the bulk of that commerce. The ships of Genoa and Venice visited all the coasts of the Mediterranean, the Black Sea, and western Europe, and the commerce with the heart of Europe was carried on by way of the Alpine passes. It is owing to the former pre-eminence of the Italian cities in this trade that so many places in the east of the Mediterranean have Italian names or names of an Italian form. The name Levant for the east of the Mediterranean is itself a name of Italian origin; the names Negroponte, Montenegro, and others are Italian; and Aleppo is an Italian form of the local name of that town.

Before the close of the fifteenth century some of the land routes for commerce with the East had already been closed through political events, but the discovery of the sea-way to India round the Cape of Good Hope gave the most serious blow to the eastern trade of the Italian cities. In 1504, a contemporary chronicler records, the galleys of Alexandria returned in February to Venice empty—a thing that had never been seen before, and in March those from Beirut were found to be empty likewise. The chronicle is continued till 1512, and speaks constantly of the scarcity of spices in Venice. In 1506 it is specially noted that at a fair in that year the Germans had bought very little. As early as 1504 a project for

cutting a sea-canal through the Isthmus of Suez, with the view of regaining for Venice its lost supremacy, began to be urged ; but this project, it is needless to say, was never carried out under Venetian auspices. The trade with Germany still continued, indeed, during the whole of the century, and also the following century ; but it was in a state of decline. At first eastern commodities were to be purchased at Lisbon, but soon the towns of Flanders and Holland (Antwerp and Rotterdam) secured the bulk of the commerce with central Europe. But as commerce has grown more world-wide, as the New World has become more populous and more wealthy, the advantage of situation has come to belong to the British Isles, which are nearly in the middle of the land-surface of the globe. This is far, however, from being the sole advantage which Great Britain possesses as a mercantile country, and hence the nature of this and other advantages will be more particularly considered elsewhere.

LANGUAGE, &c. The language of commerce, when carried on between peoples speaking different tongues, is generally of a very mongrel character. In the days when Italian trade was predominant in the Levant, there arose in all the coasts of that region a trade language, the basis of which was a corrupt Italian, but which borrowed numerous words from the local dialects in different places. This language is known as the *lingua franca*, and is still spoken in many of the eastern Mediterranean towns. The dominant languages of commerce at the present day have all begotten corrupt forms of speech of a similar nature. In Chinese ports a mongrel kind of English is spoken, which is known as 'pidgin' English (*pidgin* being the Chinese pronunciation or corruption of *business*). A 'negro English' is spoken in many places on the west coast of Africa, another kind of corrupt English in New Guinea. Arabic is spoken with many corruptions, and much admixture of words derived from other languages throughout the Mohammedan world. Swahili, the language of the mixed Arabic and Bantu race in tropical East Africa known as the Swahili, is the common medium of intercourse throughout that region, and even among many Congo tribes, and the Hausa language acts as a sort of *lingua franca* over practically all Africa north of the equator and west of the Nile valley. Hindustani, a dialect of Hindi, has become the *lingua franca* all over northern India and has been carried by Indian seamen (lascars) and Indian traders to most of the great ports of the world, and the Malay language predominates in the Eastern or Malay Archipelago. Spanish is the prevailing language of the New World south of the United States, except in Guiana and Brazil. The wide predominance of Spanish commerce in former days is still seen in the survival of a few Spanish words in more than one *lingua franca*, of which English or some other language forms the

basis. More and more, however, with the increase of telegraphy, telephony, and rapid communication, the commercial languages are becoming restricted to those of Europe—English, French, German, Spanish, Italian, and Russian.

INSTRUMENTS OF EXCHANGE. Another indispensable means of carrying on trade on a great scale is the existence of some common measure of value. Such a common measure, when it is used for no other purpose, or when chiefly used for that purpose, is money. In intercourse with uncivilised peoples it is still necessary in at least some cases to resort to barter—that is, to the exchange of articles that are intended for other purposes than media of exchange. In former days coloured beads, which were worn as ornaments, were a very common means of purchase. In the interior of Africa services and native produce are even now paid for in kind, but most native races have now developed a sense of the European standard of values. In the old trapping days of the Hudson's Bay Company, at the time when beaver-skins were of great value in Europe, a trade gun would buy from the Indians as many beaver-skins as could be piled up on each side of it. Even in civilised countries native labourers are still paid to some extent in kind ; in Africa a bag of ' mealie meal ' is a recognised unit in payment for labour.

But even where trade is carried on by barter the need for some common measure of value soon comes to be felt, and hence some article of exchange in very general use is adopted as a standard with which the other articles of barter are compared. Thus, in western Africa a piece of cotton-cloth of about six yards in length came to be very generally recognised as a unit of value, and as one yard forms a smaller unit, a piece of cloth of that size is usually made up into six folds.

The articles that have been and are used as money in different parts of the world are very various. Of all non-metallic kinds of money, that which came into most extensive use was the cowrie-shell (*Cypræa moneta*), which was very largely used in the trade of Africa and southern Asia, as well as in the islands of the Pacific. The home of this shell is the Pacific and Indian Oceans, and ship-loads of it were conveyed from the Maldive Islands, the Philippines, and other island groups, to the European ports which carried on trade with the African tribes among which this kind of money circulated. In New Guinea a small kind of cowrie is threaded in hundreds on slips of cane, and these slips serve as money. On the island of Yap, in the western Carolines, the money takes the highly inconvenient form of huge discs of aragonite, a form of carbonate of lime, quarried, it is said, two hundred miles away, in the Pelew Islands. In ancient Mexico the currency of the country consisted of ' bits of tin stamped with a character like a T ; bags of cacao,

the value of which was regulated by their size ; and, lastly, quills filled with gold-dust.' Even on the Atlantic coast of the United States it was stated, as recently as 1888, that oysters were used as money in a certain district on Chesapeake Bay, an oyster forming the regular subscription of a daily newspaper.

Of all forms of money the most convenient, and those in most general use, are gold and silver or other metallic coins, and the coining of metals is in all civilised countries one of the prerogatives of the government. Coins are seldom made of any one metal. For convenience of manufacture various alloys are used, but all coins on their issue from the mint ought to possess a definite weight of the principal metal in their composition, whether gold, silver, or copper. The proportion of that metal to the total weight of the coin is called the fineness of the coin.

The value of a coin does not always depend solely on the amount of fine metal which the coin contains. Coined money is of two sorts, which are called respectively standard money and token money. The former (which disappeared temporarily during the War) is that in which the fine metal used is the standard metal of the country—that is, the metal which ultimately fixes the value of all the coins used in the country. In order that any particular metal should form a perfect standard, the metal in question must be received for coinage in unlimited quantities by the state, the coins made with that metal must be made unlimited legal tender ; that is to say, payment in such coins must be declared to be a valid discharge of any debt, however large, whilst there must also be freedom to melt and export the coins. If gold, therefore, is the standard metal of any country, any mining company can take as much gold as it raises to the mint of that country, and receive in exchange the same quantity of gold in the form of coin, with a small reduction, it may be, for the expense of coining. In these circumstances, it is obvious that the value of the gold is represented exactly by the value of the equivalent coin, and the value of the coin will rise and fall with the value of the gold.

It is otherwise, however, with token money. The value of the fine metal in such money is fixed by law in relation to the value of the standard metal. The non-standard metal is not received in unlimited quantity for coinage at the mint ; and when the money made with it is merely a token money, it is not made legal tender except in payment of small sums. But in the United Kingdom, in which gold was the standard until abandoned in September 1931, the greater part of the circulation now consists of full-legal tender paper notes, and this is now true of most countries. Where silver or copper coins are mere token money, they represent in face value a greater value, and sometimes a much greater value, than that of the fine metal contained in them. If otherwise there would be a

natural tendency to melt the coins for the sake of the metal they contained.

Everybody is familiar with the fact of variations in the price of commodities. Now in gold-standard countries there are not only variations in the value of these commodities in relation to gold, but also in that of gold in relation to them. In countries not on the gold standard, such as Britain, it is, of course, natural to refer to values in ' sterling ' or in the case of the United States to U.S. dollars. Where there has been a greater or smaller change in one direction (whether a rise or fall) of all or nearly all commodities, it will be right to say absolutely that, whatever the cause may have been, there has been a change in the value of gold. When distant dates are compared (intervals of a generation, or one, two, or three centuries, for example) it is nearly always found that such a change in value has occurred. This is not the place to elucidate the nature and cause of such changes, but it is important to bear in mind that, whereas statistics of commerce in which values are expressed in the same standard coin afford a more or less satisfactory means of comparing different countries at the same period, they are far from being so satisfactory as a means of comparing the commerce of the same country at widely different dates. The sum of £5,000,000 in 1880 is a very different thing from the same sum in 1900. The ' purchasing power ' of the sum must be considered. These considerations make it extremely difficult to compare pre-War and post-War trade and resort is often had to the *weights* of the chief commodities.

We must here refer also to the fact that money in the form of coin is used only to a very limited extent in the discharge of pecuniary obligations, whether the parties belong to the same country or to different countries. The equivalent of coin in paper is the more usual mode of payment in the case of all but small transactions, and the proportion of debts discharged in this way is generally greater in proportion to the commercial development of the country in which the transactions occur.

Whatever the form of a paper circulation may be, its efficiency as a perfect substitute for coins depends on the fact of the holder of the paper being able to obtain the equivalent in coin whenever he wishes it. In payments made within the bounds of any particular country, the most usual substitutes for coin are bank-notes and cheques. Bank-notes are promises of a bank to pay ; cheques, orders to a bank to pay, made by persons who have money at their credit in the banks on which the orders are made. In large transactions, payment is very often made in the form of a bill of exchange, which is a demand upon a merchant to pay at a certain date a certain sum of money for goods which he has received. Such a demand is usually presented to the merchant to whom it is drawn for his

acceptance, which he signifies by his signature, and when accepted by him it becomes a valid claim against him. The details in connection with the use of bills of exchange are far too numerous to be mentioned here ; but it is necessary to state that it is usually in connection with such bills that the rate of exchange between different countries is spoken of. Bills of exchange are very generally made use of in settling debts between persons belonging to different countries, because they are a cheaper method of doing so than using coins for the purpose. If coin, or bullion, whether gold or silver, were sent, the cost of its carriage would have to be paid for ; it would have to be insured, and other expenses would have to be incurred. It is obviously, therefore, a cheaper method for a merchant who has a claim against him in another country to send over an equivalent claim which somebody else may have on some one in that country. He buys that claim in the form of a bill of exchange, and the price which he has to pay for it varies according to circumstances. It varies according to the credit of the person or persons who accept responsibility for the bill, according to the date at which it becomes due (being obviously of less value if payable three months after date than if payable at sight) ; and even with the 'best' bills—that is, those secured in the most satisfactory way by the credit of the responsible parties—it varies according to the state of trade between different countries. When the bills procurable in one country, A, against another country, B, are greater in value than those in B against A (which is equivalent to saying, when A has exported to B a greater value than B to A), A will have more bills than are necessary to meet the claims of B. Those holding such bills in A will, accordingly, be unable to get as good a price for bills as those in B who holds bills on A. They will be glad to sell them at as good a price as they can get, for they run the risk of being unable to find a customer for them, and hence being obliged to bear the expense of having coin sent over to them in discharge of their claims. Holders of bills against A in B, on the other hand, will find that there is a great demand for their bills on the part of persons who fear lest they may have to bear the expense of sending coin over in discharge of their debts, and will therefore ask as high a price as they find they can exact.

Readers must be referred elsewhere for fuller information on these matters, but enough has been said to make three facts of importance manifest : first, that the rate of exchange for the equivalents of the same coins may be different in one country from what it is in the other (which, in fact, it usually is) ; second, that there may be differences in the rate of exchange between countries having the same standard coin (as England and Australia) ; and third, that in normal circumstances the extreme limit of fluctuation in the rate of exchange for bills payable at sight, above or below the

exact equivalent of the coinage of the one country in the coinage of the other, must be the cost of transmitting the coin itself. For it is obvious that no one would pay for a bill wherewith to discharge a certain claim in money more than it would cost him to send the necessary coin or bullion.

Tables of the more important standard coins and moneys of account and of the principal units of the metric system of weights and measures are given in the Appendix.

COMMODITIES

1. Commodities dependent directly or indirectly on Climate

A. Products of the Temperate Zone.

WHEAT. This, the most valuable of all the grains of temperate climates, has been cultivated from the remotest antiquity. The remains discovered at the lake-dwellings of Switzerland belonging to the Neolithic period, or New Stone Age, show that at that time, long before the beginning of written history, as many as five different varieties of wheat were already in cultivation. The crop early acquired an important place as an object of agriculture in all parts of the temperate zone in the Old World where the climate was favourable to it, and gradually extended its domain at the expense of other crops which in certain regions were more easily grown, but which yielded a less valuable grain. Though in the New World wheat, like most other grain crops, was unknown in the time of Columbus, its cultivation has since spread there to such an extent that Europe now makes up by supplies obtained thence the greater part of her own deficiency in this cereal. In Australia also this grain is now in general cultivation, and in fact there are few parts of the world with a suitable climate and a sufficient population where wheat is still unknown.

A crop so valuable, so widespread, and so long in cultivation could not fail to exhibit a great number of varieties and to show the result of past care in improved quality. The varieties of wheat cultivated at the present day yield larger grains than those of the ancient lake-dwellings. The number of the varieties now grown is probably in a literal sense countless, new varieties constantly being produced. Very often these varieties, as in the case of other cultivated plants, manifest strong local preferences, and do not flourish except in particular regions. The seeds of English wheat fail in India; and, on the other hand, the wheat-growing region of northern India, in which the crop has to ripen during the cool season before the advent of the scorching heats of summer, has developed varieties of wheat which ripen in a shorter period than those of colder climates, but which pine and dwindle when an attempt is made to grow them in England. It is still more important that varieties have been developed which ripen in the short summers of the Canadian north-west

and Siberia. Not only does the behaviour of the crop under cultivation thus vary in different regions, but there is also a difference in the composition of the grain derived from crops grown in different parts of the world.

The **best soil** for the cultivation of wheat is one in which clay predominates, but which is not too stiff and heavy. As regards **climate,** wheat demands a higher temperature than any of the ordinary cereals of the temperate zone, except maize, so that its northern limit lies to the south of those of oats, rye, and barley. Further details of interest regarding the soil and climate best adapted for wheat are given in the following paragraphs, extracted from the report in the Tenth Census of the United States.

'As regards soils, we may say in a general way that light clays and heavy loams are the best for wheat. On the one hand, very heavy clays often produce good crops, both as to yield and as to quality; and, on the other hand, the lighter soils may yield a good quality—it is simply smaller in quantity. The best crops, however, come from moderately stiff soils, but any fertile soil will produce good wheat if all the other conditions are favourable. Good wheat-lands agree in this: that they are sufficiently rolling for natural drainage, are at the same time level enough to admit of the use of field machinery, and are easily tilled, admitting the use of light field implements in their tillage, and thus allowing of a very large production of grain in proportion to the amount of human labour employed.' It is because of the cost of ploughing clay land (requiring a three-horse plough in place of the usual one- or two-horse) that heavy soils have gone out of cultivation in England.

'For commercial as well as agricultural success, climate is an all-controlling condition. Wheat is normally a winter annual. For a good crop the seed must germinate and the young plant grow during the cool and moist part of the year, which season determines the ultimate density of growth on the ground, and consequently mostly determines the yield. It ripens in the warmer and drier parts of the year, which season more largely determines the quality, plumpness, and colour of the grain. In climates with winters so cold that all vegetable growth is suspended, we have two distinct classes of varieties, known respectively as spring and winter wheats. . . . In California, and in similar climates, as in Egypt, this distinction does not exist in respect to their cultivation, although the varieties partake more of the character of winter wheats than of spring, both in their mode of growth and in the character of the flour made from them. But in all climates, and whatever variety may be grown, the crop must be sown and have its early growth in a cool part of the year. Wheat branches [" tillers "] only at the ground, and produces no more heads than stalks, and it only sends out these branches early in its growth or during cool weather, and when the

growth is comparatively slow. A cool, prolonged, and rather wet spring is therefore best for the ultimate yield of the crop, a warm, rather dry, rapidly growing, and early spring diminishes the yield ; there are then fewer stalks, and the heads are fewer.' It is thus clear why the great mid-continent grasslands of the world (see pp. 40–1) with their spring rains, favour wheat cultivation.

'In a country of cold winters, for good crops it is better that the ground be continuously covered with snow. Bare ground, freezing and thawing, now exposed to cold and dry winds, and now to warm sunshine, is exceedingly destructive to wheat. It "winter-kills" in two ways : it may be frozen to death by cold, dry winds, or, as is more often the case, particularly in soils rich in vegetable matter, it "heaves out," and by the alternate freezing and thawing of the surface soil the roots are lifted out of the soil and the young plant perishes.' A little before the time of harvest, some moisture is required to 'swell the grain.'

'The quality of the grain is largely determined by the climate, a hot, dry, and sunny harvest-time being best for wheat of the first grade. The wheat of sunny climates—those of California, Egypt, Northern Africa, and similar countries—has always ranked high for quality. The particularly bright character of American grain depends upon the climate rather than upon the soil. The sunny climate of the whole United States south and west of New England is favourable for this, and from the time of the first settlement of the colonies the bright colour of American grain as compared with that of Northern Europe, particularly that of Great Britain, has been remarked.'

The following table, based on *The International Year-Book of Agricultural Statistics*,[1] gives for the average of the years 1931–35 some typical illustrations of the differences in the average yield of wheat in bushels per acre in different parts of the world :—

Countries.	Bushels.	Countries.	Bushels.	Countries.	Bushels.
Belgium	40	Holland	45	Japan	28
Denmark	43	Hungary	21	United States	15
United Kingdom	33·5	Roumania	13	Canada	19
Germany	32	Bulgaria	17	Argentina	13
France	24	Russia[2]	11	Australia	11
Italy	21	India	10	New Zealand	30

The countries that stand highest in the list are mostly such as have a dense population and a system of agriculture that has been undergoing continuous improvement for generations—countries, accordingly, in which manure is cheap relatively to the value of the

[1] Published by the International Agricultural Institute, Rome. For details of pre-war yields, see Dr. Unstead's 'Statistical Study of Wheat Cultivation and Trade,' *Geog. Jour.*, vol. xlii. (1913).

[2] U.S.S.R. in Europe and Asia.

land, or those with rich soil only recently brought under cultivation. Three cases of an exceptionally low yield per acre are worthy of special notice as illustrating the effects of different causes. In Victoria and Australia generally the low out-turn is to be ascribed mainly to the climate, which has but a scanty rainfall, and is hence unfavourable to the tillering of the wheat and the filling of the ear, but, it may be added, is warm and sunny, which is highly favourable to the quality of the grain. But in recent years great improvements in yield have been effected. In South Australia the average yield for 1914–24 was 11·4 bushels per acre, whereas during part of last century it was only about 5. In Russia the low average of the out-turns was, at least until recently, in great part due to the backward state of cultivation, for the soil on which much of the Russian wheat is grown is one of the best in the world. A large part of the wheat-growing area of Russia may, however, like those of Victoria and South Australia, be described as lying on the margin of adequate rainfall, so that the yield of the crop varies greatly with the amount of the rainfall, and the same is true of such areas as the western Prairies of Canada and adjoining parts of the United States. In the years 1914–35 the yield of wheat in Victoria [1] varied from a minimum of 1·38 to a maximum of 17·2, in New South Wales from a minimum of 2·98 to a maximum of 17·8 bushels per acre. In Manitoba the average yield in 1900 was less than 9, in 1901 more than 25 bushels per acre. These may be compared with the returns for Tasmania and New Zealand,[2] in which the rainfall is more ample, and in which the extreme yields in 1914–35 were about 19 and 23 and 22 and 37 bushels respectively. In Argentina several causes combine to bring about a low average yield. In some years droughts destroy the crops (especially in the west of the wheat-growing area), in other years floods, in others frosts (especially in the south), but more than all these, locusts (especially in the north). Hence here also there are great variations in the calculated yield. In 1896–97 it was estimated at about 5 bushels per acre, as against 16½, in 1893–94, or 14 in 1919–20 or 16 in 1933–34.

The superiority of wheat as a food-grain for man depends chiefly upon the quality of the bread made from the flour, which is generally regarded as more palatable than any kind of bread made from other grains, even though these may be little, if at all, inferior to wheat in nutritive properties; but this superiority is so generally recognised that it is difficult for us to realise the fact that wheaten bread was a rarity even in some parts of England within the last century and a half. It is still a rarity, at least for the poorer classes, over a large part of the European mainland, though it is now coming more and more into use even among the poor. This result is solely

[1] In 1903 the Victorian yield was only about 1·3 bushels per acre.

[2] The lowest yield on record from 1868 to 1930 was 18 bushels in 1897–98.

due to the rapid extension of commerce since the introduction of steam-power. Europe, while constantly increasing its consumption of wheat relatively to population, has been growing less and less able to supply its own wants in this article, and thus becoming more and more dependent on supplies from elsewhere. The consequence is, that the international commerce in wheat and wheat flour has not only come to exceed that in all other grains, but has grown to a magnitude rivalled only by that in a few other articles, such as cotton and wool, the two great clothing materials of the world. The great wheat-importing countries are those of the west of Europe, in which manufacturing industry is so highly advanced that there is a relatively large population dependent on supplies from abroad; and the United Kingdom stands at the head of the list, taking the largest share of the wheat export from all the great wheat-exporting countries, so that an account of the British wheat trade will serve to give a general view of the wheat supply of the whole world.

Early in the eighteenth century England could not only supply all her own wants in wheat, but in good years could even spare more than a quarter of a million bushels for export, and it was only towards the close of the century, after the great development of the cotton manufacture had begun, that the importation of grain became a regular necessity. The amount of the import continued on the whole to increase, notwithstanding the existence of import duties, which were generally fixed on a scale which imposed a very high duty when the price of wheat sank to a point which was then considered very low. In those days the chief supplies for the United Kingdom were derived from France and other countries belonging to the continent of Europe. From February 1, 1849, a uniform import duty of one shilling per quarter was established, and on June 1, 1869, even this was abolished, both wheat and flour being admitted into this country from that date duty free.[1] Meanwhile the dependence of the British Isles upon foreign wheat has been steadily increasing, and their sources of supply have become more widespread. It has been estimated that shortly after the middle of the nineteenth century the United Kingdom produced on an average between 70 and 80 per cent. of all the wheat consumed in the country, whereas on the average of recent years the proportion of home-grown wheat to the total consumed has sunk to somewhat less than 15 per cent.

The removal of the almost traditional British free-trade policy by the National Government in 1932, and the institution of a wheat quota, has stimulated a greater home production.

The following table presents some of the most important facts relating to the British import trade in wheat in periods of five years.

[1] A duty of 3*d*. per cwt. on wheat, 5*d*. on flour, was levied in 1902–3.

The British export trade in wheat is small, but there is a large export of British milled flour.[1]

Total British Import of Wheat, whether as Grain or Flour, in Equivalent Weight of Grain.

From 1871 to 1900, countries from which the wheat was shipped, afterwards the countries of origin.	Percentages of total import.						Consigned.			
	1871–1875.	1876–1880.	1881–1885.	1886–1890.	1891–1895.	1896–1900.	1906–1910.	1911–1913.	1924–1929.	1931–1935.
Atlantic Ports	*29·4*	*41·8*	*35·4*	*32·5*	*41·6*	*49·7*	—	—	—	—
Pacific Ports	*10·4*	*11·5*	*18·1*	*15·6*	*10·5*	*9·9*	—	—	—	—
Total United States	39·8	53·3	53·5	48·1	52·1	59·6	26·8	29·4	29·4	2·8
Argentine Republic	—	—	—	1·5	8·0	8·4	19·1	16·2	23·3	20·6
Canada	7·4	6·0	3·5	3·4	5·1	7·8	15·1	24·8	37·4	32·0
Russia	23·4	12·6	11·7	18·5	14·3	9·6	14·0	10·7	—	7·8
India	1·4	4·8	12·3	11·8	9·5	4·3	11·7	21·4	3·9	0·7
Australasia	2·2	3·7	5·2	2·4	3·0	1·7	8·5	21·4	13·2	19·3
Austria-Hungary	0·9	2·2	2·6	3·0	1·5	1·5	0·4	12·3	—	0·4
Germany	9·2	7·8	5·5	4·1	1·0	1·3	0·6	0·1	—	2·2
Others	15·7	9·6	5·7	7·2	5·5	5·7	3·8	0·7	—	7·4
	Annual Average in Millions of Cwts.									
Total	50·49	63·31	76·78	77·79	96·58	95·37	113·94	119·4	119·4	120·0

These vast imports have led, first, to a lowering of the price of wheat, the mean of the yearly averages of the price of the imperial quarter of wheat having sunk from 54*s.* 6*d.* in 1871–75 to a minimum of 22*s.* 10*d.* in 1894. This has led to a steady contraction in the area devoted to wheat, which in 1860 occupied about 4,000,000 acres in the United Kingdom, but on the average of the five years 1881–85, about 2,830,000 acres. A further decline followed. A minimum of 1,456,000 acres occurred in 1895. During the War, efforts were made to increase the home production, but in post-War years acreage and production dropped again, the acreage falling in Britain to a new low level of 1,250,000 in 1931. The National Government, reversing the Free Trade policy of the preceding seventy years, encouraged wheat cultivation by a quota system so that the acreage rose rapidly to 1,875,000 in 1935, slightly less in 1936.

If we now look at the **sources of supply** as shown in the table, we must first notice that it is not till the period 1906–10 that we get the true countries of origin, but a comparison with the so-called 'import' tables shows that of the countries mentioned there is a serious misrepresentation only in the case of the United States, Canada, and Russia.[2] In the latter part of the nineteenth century

[1] According to the practice of the International Institute of Agriculture, 100 of wheat flour is reckoned as equal to 133 of wheat. Grain of all kinds may be shipped either bagged or in bulk, but by the latter method about 12 per cent. additional weight can be carried and the cost of the bags is saved. One great advantage of the use of elevators is that they facilitate bulk transport.

[2] In 1906–10 the quantity derived from the United States was overstated in the 'imports' table, and that from Canada understated, by a little over one million cwts.; that from Roumania was overstated and from Russia understated by a little over half a million cwts.

the striking feature is the largely increased proportion of a much larger total derived from America. In the last quinquennium of the century, the United States, Canada, and Argentina furnished more than three-fourths of the total supply. In Argentina, which first appeared in the British import tables as a source of wheat in 1883, the expansion has been due to the opening up of a new region of virgin soil. In the United States and Canada, where the conditions of wheat production are very similar, we see in the period referred to a more striking illustration than ever before of the triumph of modern methods of production, handling, and transport. The subsequent decline in the proportion obtained from the United States is due at least in part to the development of that country as a great manufacturing country.

In both Canada and the United States the chief circumstance favouring the cheap production of wheat and other grain crops was the vast extent of arable land relatively to the number of inhabitants, and the consequent cheapness of the land. Two results of this cheapness of the land were that the average size of farms in the United States was considerable (from 1890 to 1910 averaging 140 acres or nearly the quarter square mile block—a little over half the average farm being actually ploughed), and that a large proportion of the farms belong to those who cultivate them.

In **India**, on the other hand, the chief circumstance favouring the cheap production of wheat was the cheapness of labour. The climate in those parts of India in which wheat cultivation is chiefly pursued, the North-West Province, the Punjab, and the United Provinces, is on the whole as favourable to the growth of wheat as in the United States, though in many parts irrigation is necessary in consequence of insufficient rainfall. The bulk of the Indian crop is grown for home consumption and in most years there is now little or no surplus for export.

But the table brings out another point of importance. Down to the period 1881–85 the wheat import from the United States came in a greater and greater proportion from the Pacific ports—that is, principally from California, Oregon, and Washington, where rich wheat-fields are close to the seaboard. Since then the Atlantic ports of the United States and Canada have supplied the larger proportion, a result of the multiplication of railways in the interior of N. America east of the Rocky Mountains. The advantages of cheap land, large-scale methods of cultivation, a very favourable climate and efficient transport organisation fully make up for the disadvantages of long distance from the European market.

It is interesting that the limiting factor in distance is that from the farm to the nearest railway station—there is little possibility of an economic success where this exceeds 20 miles.

The pioneers of the United States and Canada have been, in

general, individuals, and the family farm is the rule. There was one period in development when the so-called 'bonanza' or great wheat farms of, say, 5,000 acres were an important feature. They employed about 40 men in the ploughing season, and an excellent description of these farms, from the tenth edition of the *Encyclopædia Britannica*, will be found in the earlier editions of this work.

'The transportation of the wheat from the fields of the North-West to the seaport is a business of tremendous magnitude. Most of this wheat goes by way of the lakes through the Sault de Sainte Marie Canal to Buffalo, where it is shipped by rail or inland canal to New York, Philadelphia, or Baltimore. Duluth, on Lake Superior, is, surprising to say, one of the first ports in the United States in point of tonnage' (see below under Canada for recent developments).

It is the produce of these fertile regions, together with that of Argentina, which seems to have had the principal effect of lowering the price of wheat and driving that grain out of cultivation in the United Kingdom in the latter part of the nineteenth century. Now it is to be noted that, fertile as these regions are, they are bound sooner or later to meet the same fate as land similarly treated elsewhere in America has already undergone, namely, to become gradually less productive unless more expense is incurred in maintaining their fertility.

From the United States and the Dominion of Canada an increasing proportion of the wheat import is in the form of flour, and it is in that form that we formerly received the wheat imported from Hungary. The Hungarian millers are, in fact, noted for the unsurpassed, if not unequalled, quality of their flour, due to the excellence of their wheat, the perfection of their machinery, and the elaborateness of their methods, but partly also, it would seem, to the dryness of the climate; for it has been found that, even from Hungarian wheat, flour of equal quality cannot be made in the moist climate of Great Britain by the same methods and machinery.

Besides the countries mentioned in the preceding table, wheat is imported into the United Kingdom from Belgium, Iran, Iraq, Chile, and many other parts of the world.

Being thus supplied with wheat from all parts of the world, both in the northern and southern hemispheres, the British Isles receive these supplies more or less all the year round, the date of the arrival being dependent not only on the time necessary for transport, but also on the date of the harvest, which varies greatly in so many latitudes and climates. The following table, the particulars of which, except in the case of North America, are mainly derived from Scherzer, shows that there is not a month in the year, in which a wheat harvest does not take place in some part of the world :—

Date of the Wheat Harvest in Various Countries.

January	Australia, New Zealand, Argentine Republic, Chile.
February	India.
March	India, Upper Egypt.
April	Mexico, Cuba, Lower Egypt, Syria, Persia, Asia Minor.
May	Morocco, Algeria and Tunis; the northern parts of Asia Minor, China, Japan, Texas, Florida.
June	The Mediterranean peninsulas and the south of France; California, Oregon, Utah, and the greater part of central and eastern United States territory south of 40°; Afghanistan, Japan.
July	France, Hungary, southern Russia, the northern parts of the United States of America, Ontario, and Quebec.
August	England, Belgium, the Netherlands and Germany; the eastern parts of the Dominion of Canada.
September	Scotland, Sweden, Norway, Russia.
October	Finland, northern Russia.
November	Peru, South Africa.
December	Burma, South Australia.

With regard to the total trade in wheat of other European countries than the United Kingdom, it is worthy of note that there are only six—Russia, Roumania, Hungary, Yugoslavia, Bulgaria, and Poland—which exhibit an excess of exports over imports in this commodity. Not long ago France and Spain also exported in good years a considerable excess of wheat and wheat-flour, but both these countries are now to be reckoned among the countries that import more wheat than they export. A part of the French import of wheat, like that of other Mediterranean countries, was, until recently, derived from India, the hard wheats of that country finding the readiest market in that region, since these yield the flour best adapted for the making of the tubular pastes known as macaroni and vermicelli, which are favourite forms of wheaten food in Italy and other Mediterranean countries.

Taken as a whole, Europe still produces much more wheat than any other continent, even excluding Russia, between 30 and 40 per cent. of the world's total. The world's output is now at least 120,000,000 tons or 4,450,000,000 bushels. This may be compared with an estimated total of 1,276,000,000 bushels in 1883–84.[1]

MAIZE or CORN is the only grain-crop which was introduced into the Old World from the New, and it owes the name of Indian corn, by which it is frequently known in England, to the fact that it was the only cereal of importance cultivated by the American Indians before the discovery of that continent by Europeans. Being a very

[1] According to the admittedly incomplete estimates of the International Institute of Agriculture, the world's wheat-crop in 1912–13 was equal to 3,631 million bushels (of 60 lbs.), of which 1,888 millions (52 per cent.) were produced in Europe. In 1929, 42 per cent. were produced in Europe (excluding Russia). It is now very difficult to get the figures for the whole of Europe as the U.S.S.R. includes both Russia in Europe and Russia in Asia.

productive crop—for it yields, under equally favourable conditions, fully twice as much grain to the acre as wheat—its cultivation spread very rapidly in the tropical and some of the warm temperate parts of the Old World when it became known there, but apparently much more rapidly in Africa, and even in the east of Asia, than in Europe; the reason of this, no doubt, being that the countries which were at that time most advanced in agriculture and industry were those in which the climate is least suitable for its cultivation.

Among other countries from which the cultivation of maize is excluded by the character of the climate is England, where the summer is not sufficiently long, warm, and sunny. The ideal **climate** for this grain is one with a summer 4½ to 7 months long, without frost, the middle portion hot both day and night, sunny skies, sufficient rains to supply the demands of a rapidly growing and luxuriant crop, falling at such intervals as to best provide sufficient moisture without ever making the soil actually wet. It is thus essentially a summer crop, and one that requires summer rains (or irrigation), though not very heavy and frequent rains. It is therefore unsuited to those countries which, like California, Chile, and most of those round the Mediterranean, though admirably adapted for the growth of wheat, are characterised by summers of remarkable dryness. It was this circumstance that seems chiefly to have caused the slow progress of its cultivation in Europe (except in Portugal), although it was gradually found to be very well adapted to the central parts of that continent, including northern Italy, and above all to the eastern parts (Roumania, with the adjacent parts of Russia), where the greater part of the rainfall of the year occurs in summer, and where the summers are at the same time remarkably sunny. The same characteristics render the climate of a great part of the United States eminently suited to this crop, which is, in fact, the principal corn-crop of the country; so that when a native of the United States speaks of 'corn' simply, it is always maize that he means, just as an Englishman means by the same word wheat. In the Commonwealth of Australia maize is the most important grain crop in Queensland, and in New South Wales it ranks next after wheat. In South Africa it is the leading crop. The principal use of maize is as feed for cattle and pigs—the grain, meal and young juicy plants all being used. In the United States 'Corn Belt' the bulk never leaves the farm on which it is grown, save 'on the hoof.'

The quantity and value of the maize imported into the United Kingdom (chiefly for the feeding of cattle and horses) are next to those of wheat among grain crops.

Down to the end of last century more than half the import was usually derived from the United States, which was followed by Roumania, but since then Argentina has come to the front, and now in most years furnishes more than half the import, while the share

of the United States has come to be comparatively small. Till the war Roumania retained the second or third place. Now Argentina is pre-eminently the largest exporter, followed by Roumania, Yugoslavia, South Africa, and Indo-China. The great importers are the dairy-farming countries of northern Europe.

In the British Isles maize is used as human food only to a very limited extent, and chiefly in the form of the so-called ' corn-flour ' ; but in many of the countries in which it forms a staple crop it is used as human food much more largely and in various forms. In the United States the heads of green (unripe) maize form a favourite vegetable the grains being eaten like peas in this country along with meat, and a preparation known as hominy—a kind of pudding made from coarsely ground maize meal—is much liked. ' Corn on the cob ' is rapidly becoming a popular vegetable in Britain as well. In Mexico maize is still, as it always has been, the principal food of the people, being coarsely ground at home and made into a kind of cakes called tortillas, which are eaten warm. The polenta, which forms a chief part of the food of the inhabitants of Italy, except in the extreme south, is generally made from maize-meal ; and so too is the mamaliga of the Roumanians. In Transcaucasia the heads of maize are cooked under the name of kukurus. Maize is the staple food grain in nearly all the damper parts of Africa and in South Africa ' mealies ' as the corn cobs are called and mealie meal enter considerably into the diet of the white races. Various kinds of beer and spirits are also made from maize, which is now used to some extent even by English beer-brewers.

OATS. This crop can be cultivated with advantage over a wider range in latitude and on a greater variety of soils than wheat ; but the climate best suited to it is one that is moister and has cooler summers than that best adapted for the latter crop. Such climates produce grain of better quality for all the purposes for which oats are grown, and, moreover, produce a much greater weight of grain per bushel, the variations in this respect being much greater than in the case of wheat. Whereas wheat does not often weigh much more or much less than 60 lbs. per bushel, oats grown in one place may weigh 50 lbs., in another place only 26 lbs. per bushel (average 39). This circumstance is all the more important since there are also great variations in the amount of meal yielded by oats, only the best qualities yielding as much as half their weight. Oats are consequently grown chiefly in the more northerly and moister parts of Europe ; but still, being more easily grown than wheat, the quantity of oats produced exceeds that of wheat in most European countries, except those on the Mediterranean, the summers of which are wholly unsuited to this crop. This crop is by far the most important in Scotland, Ireland, Denmark, and Scandinavia. There is a large crop in Russia (north of the wheatlands) and in the United States.

Taking the British Isles as a whole, we find that oats form easily the leading cereal crop. This is the case even in England and is overwhelmingly true of Scotland with its cool summers (too cold for wheat except in favoured localities) and of Ireland with its damp conditions. Whilst wheat in England is almost restricted to the drier east the cultivation of oats is widespread. The total quantity of oats imported into the United Kingdom is on the average a good deal less than a tenth of the total quantity of wheat and flour. Before the War Russia was regularly the leading country of origin, but now the chief sources of supply are the Argentine Republic, Canada, and (much less important) the United States. Among British possessions, oats form an important cereal crop in New Zealand, and until 1910 was the rival of wheat in Canada.

In those countries in which this grain is chiefly grown, it generally forms a part of the food of the people. In Scotland it constituted, in the shape of oatmeal porridge, oat-cakes, and other forms, the chief food of the people as late as the end of the eighteenth century; but it is mainly as provender for horses that oats are now grown, this grain being proved by experience to be the best for that purpose. In ancient times the grain was not much grown—no doubt in consequence of its unsuitableness for the climate of the countries round the Mediterranean, where the civilised nations of antiquity had their seats. It is not mentioned in the Bible, but it was cultivated in a small way in Italy, as food for horses, as early as the beginning of the Christian era. In central Europe, nevertheless, it was a grain of much greater antiquity, for it is found among the remains of the lake-dwellings of Switzerland, but not, according to Prof. Heer, among remains of as great age as some of those which include grains of wheat.

BARLEY. This is in several respects a highly remarkable crop. By some writers it is believed to be the most ancient of cultivated grains. Several varieties of it (including two of that kind which is known in England as bere or bigg, having six instead of two rows of grain in the ear) have been found among the remains of the lake-dwellings of Switzerland. Its range in climate is wider than that of any other cereal, cultivation having led to the development of some coarse varieties which ripen their grain within a shorter period than the hardiest varieties of oats. Hence, of all cereals it is that which reaches farthest north in latitude, and highest up on mountain slopes. In Norway it is cultivated even in 70° N. On the other hand, it flourishes well in any soil and under any climate that is suited for wheat, and it is in such climates that the best barley is grown. Thus it happens that it is the associate of oats in the northern countries of Europe, which are on the whole too cold for wheat, and the associate of wheat in the southern countries of Europe and the other countries round the Mediterranean, which are too dry in summer for maize, but

where the barley, like the wheat, is of excellent quality. In the United States the state that grows the largest proportion of barley is California, which, like the Mediterranean countries, has a climate unsuited both for maize (except on irrigated land) and for oats.

Barley appears to have been the chief bread-plant of the ancient Hebrews, Greeks, and Romans, no doubt because it was the most productive of the grains suited to the Mediterranean climate, for the quantity of grain which it produces to the acre is usually greater than that of wheat (in England about one-fourth greater). Barley-bread was once common in Scotland, where it is still used to some extent, and it is likewise eaten in Scandinavia; but nowadays barley is principally grown for the sake of the beer made from malt, that is, from barley-grain which has been allowed to sprout and then been killed. It is for this purpose that it is so largely grown in England; and for the same reason it is a very important crop in Germany and the other beer-drinking countries of Europe. Half of the world's total is grown in Europe, but this home production is supplemented by an import. The quantity of barley imported into the United Kingdom is less than one-sixth of the wheat and flour import. Since the War the principal countries of origin are Roumania, Russia, Canada, the United States, and Chile. The barley supplied by Asia Minor, not great in amount, is noted for its high quality. In Scotland and Ireland considerable quantities are used in the making of whisky.

RYE. This is the least familiar of all the grain-crops grown in the British Isles, but there is probably no other cereal except wheat that is cultivated so largely on the mainland of Europe as a bread-plant. Its great recommendation is that of all the bread-plants it flourishes on the poorest soil and in the most inhospitable climates, though the optimum conditions are similar to those for wheat. It is hence a great boon to the vast tract stretching from Holland, through northern Germany, into central Russia, which is mainly covered by a poor, sandy soil. Throughout that region it is the prevailing bread-plant. In the United Kingdom where grown at all it is so chiefly as a fodder crop, for which purpose it is useful in the south of England in the period between the exhaustion of the supplies of root crops and the maturing of clover and lucerne. In the United States the use of the grain in the making of bread is diminishing, as the immigrants from northern and eastern Europe have got used to wheaten bread in place of the nourishing but sour rye bread of the old lands, but rye-whisky is popular. The straw, which is largely used for packing and making certain kinds of paper and pasteboard, is there regarded in many places as the most valuable part of the crop. Formerly, however, it was otherwise.

BUCKWHEAT. This is a grain-crop almost unknown to the agriculture of the United Kingdom, but of importance in many other

parts of the world. It does not belong, like most of the grain-crops, including all those already mentioned, to the great family of the grasses, but is an ally of some of our common weeds, such as snake-weed and persicaria, and a more distant ally of the common dock or sorrel. It is a native of eastern Asia, and was introduced into Europe only at a late period. Its French name, *sarrasin*, appears to indicate that in that country it first became known through the Saracens or Arabs. The grain is said to be very nutritious, and the crop has these recommendations, that it can be grown with hardly any cultivation on the poorest soils, especially, like rye, on very light, sandy soils, and that its sowing-time is late (in the United States from May to the middle of August), which often allows of its being sown to replace another crop that has failed. But against these advantages there are to be placed the great disadvantages that its yield is very uncertain, and that the very ease with which it can be grown encourages slovenly habits of cultivation. The only countries in Europe in which there is a considerable extent of ground under this crop are Russia and France.

PULSES. This is a general term rather vaguely used for certain pod-fruits—that is, fruits (in the botanical sense of that word) having large seeds enclosed in a long seed-vessel, the most familiar examples being peas and beans. The vegetable forms which have this kind of fruit are extremely numerous, and comprise lofty trees as well as tender plants; but the term pulse is confined to such as supply seeds or pods capable of being used for food by men or cattle. For the most part, the pulses of commerce are derived from green plants often weak-stemmed, but we may include under this head the fruit of two trees, the carob, or locust, and the mezquite.

The chief pulses of commerce are common peas and beans, chick-peas, and soya-beans. **Peas** are those suited to the coldest climate, and are largely cultivated everywhere in the less warm parts of the temperate zone, though not confined to these parts. Many varieties of the **common bean** (*Phaseolus vulgaris*, Linn.) are cultivated, some suited to one climate, some to another; some grown solely as food for horses and cattle, others eaten by man. The largest imports of beans into this country are from the warmer parts of the temperate zone, and also from tropical lands such as Madagascar. The acreage under beans in Great Britain and under peas is considerably less than in the later part of the nineteenth century. A distinction is made between 'field peas' and those grown in market gardens for immediate human consumption or for drying or canning for human food. The canning of peas in Britain has been greatly extended in recent years. **Chick-peas** (*Cicer arietinum*, Linn.) are an important product and article of trade in southern Europe and northern Africa, and also in India, where the crop is known as gram. In Spain they are one of the chief articles

of diet of the people, and from Spain have become known in the former Spanish colonies of Cuba, Central and South America. In warm countries, where butcher-meat is little consumed, this and other pulses are in fact an almost essential part of the regular diet, since they supply elements of food not contained in sufficient quantity in grain and fruits. It is for this reason that **soya-beans** are largely consumed in two other warm countries, China and Japan. According to Decandolle this bean is indigenous in Cochin-China, Java, and Japan. It is now very extensively cultivated throughout eastern Asia, and it has been introduced into some parts of central and eastern Europe on account of its value as a cattle food. The beans have long been exported in large quantity from Manchuria to Japan and southern China. In 1908 a large export from the same source to Great Britain and other European countries began and developed with great rapidity, the beans being used partly as cattle food, partly as a source of oil to be used in soap-making and for other purposes, which still allowed the pressed cake to be available for cattle. Before the War the British import came largely from Russia as well as China and Japan. The cultivation of this bean has been introduced with success into the cotton belt and the southern part of the maize belt of the United States. Soya, an extract from soya-beans, is also exported to Europe, and especially to England, to be used as an ingredient in soups and sauces, but much of the so-called soya is manufactured in Europe itself from various mushrooms. Here also may be mentioned the **ground-nut** or earth-nut (*Arachis hypogæa*, Linn.), so called because the pod ripens underground, popularly known also either here or in America as the monkey-nut or pea-nut, which, although cultivated chiefly as an oil-seed, is also largely used as a fodder-plant and increasingly, too, as human food. It is of remarkably wide range in latitude, being grown from the heart of the tropics to as far north as 37° in the United States, the northern limit of the cotton belt. In that country it occupied in 1918 considerably more than 2,000,000 acres, and the production was nearly 56,000,000 bushels. Of recent years the acreage has been rather over 1,000,000 and the production 300,000 tons. It thrives in very poor, sandy soils which may be of little use for other crops.

Among other pulses of more or less importance in agriculture and commerce are **lentils, vetches,** and **lupines,** all of which are cultivated for their pods in southern Europe and the Mediterranean region generally; lentils also in India. **Lentils** are celebrated for the nutritious character of their seeds and the meal derived from them is the basis of many invalid and other patent foods advertised under various names. In central and western Europe vetches and lupines are cultivated solely for use as green fodder, lupines being a crop of special importance in certain localities, from its being adapted to

very light, sandy soils. In common with nearly all members of the pea and bean family, these crops actually enrich the soil since bacteria occupying nodules on the roots have the power of 'fixing' atmospheric nitrogen and converting it into nitrates available as plant food.

The long flat dried pod of the carob-tree sold in our shops under the name of **locusts**, and sometimes called St. John's Bread, from the fact of its being supposed by some to be the locusts stated in the New Testament to have been eaten by St. John the Baptist in the wilderness, is the fruit of a tree (*Ceratonia siliqua*, Linn.) belonging to the Mediterranean generally, but especially abundant on the island of Cyprus. The pods have now become a considerable article of export from that island, and are sent to England to be used for cattle-fodder. So rich are the Cyprus carob-pods in sugar that a sweet juice can be extracted from them capable of being used in preserving fruits, as well as for the other purposes to which sugar is applied. **Mezquite** is the name of several species of American trees of the genus *Prosopis*, producing a sweet pod something like that of the carob-tree. The most widely distributed species (*Prosopis dulcis*, Kunth), to which the Spaniards gave the name of the carob (algarrobo), after the similar tree of their own country, has pods nearly or quite two feet in length ; but this is rather a tropical tree than a tree of the temperate zone. The species to which the name mezquite is given in North America (*P. juliflora*, DC, and *P. pubescens*, Benth.) have smaller pods, which, as well as the beans contained in them, are much relished by cattle. They are abundant in the north of Mexico and in the United States from Texas to California, and in western Texas, especially since forest fires have become less frequent.

POTATO. This important plant is one of the gifts of the New World to the Old. The cultivated species, which is known to botanists as *Solanum tuberosum*, Linn., and is hence a member of the same genus as our common weed the woody nightshade or bittersweet, is a native of the high and dry regions of the Andes from Chile to Venezuela, and its introduction thence into other countries has proved of immense importance on account of its extreme productiveness, its easy cultivation, and its remarkable powers of acclimatisation, varieties of this plant being capable of cultivation from the tropics to the farthest limits of agriculture even beyond the polar limit of barley. There is much uncertainty as to the date of its introduction into Europe, and into particular countries. It is believed to have been known in Spain in the first half of the sixteenth century, but Italy is said to have been the country into which it was first introduced (about 1560), and it was certainly cultivated in that country before 1600. It is commonly said to have been introduced into Ireland by Sir Walter Raleigh from Virginia in 1586, but this statement is certainly not accurate as it stands. It is certain that it was not Sir Walter Raleigh who introduced any plant from Virginia

about that time, though colonists originally settled in America by Sir Walter Raleigh may have done so ; but it is not at all certain that the potato was the plant then introduced—and, even if it was, it is not to be inferred that the potato was originally a native of Virginia. It is certain, too, that the plant first known in England as the potato was not that which is now so called, but the batatas or sweet potato.

Whatever may be the truth as to the date of introduction, we know that it was long before the potato rose into favour as an object of agriculture in most European countries. In Ireland it was earlier cultivated than in Great Britain. In England its cultivation did not become general till the eighteenth century, and it was only in the latter half of that century that it came to be widely cultivated in Germany (where its cultivation is now more widespread than in any other country on the European mainland), as well as in France, Austria, and Hungary. It even required the exercise of the autocratic powers of Frederick II. of Prussia to effect its introduction into the sandy districts of Pomerania and Silesia. In north Germany the potato is said now to make up over half of the food of the working-classes as it is known also to be the staple article of diet with the peasantry of Ireland.

Owing to the great bulk of this commodity compared with its value, the foreign trade in it is carried on mainly with neighbouring countries. The greater part of the requirements of the United Kingdom are home grown, the import being of early potatoes, before the home crop is ready, and comes from France, the Channel Islands, Spain, the Netherlands, and Canary Islands. The Channel Islands, where the cultivation of early potatoes is a staple industry—above all, in Jersey, which is almost one large potato-field—supply about one-sixth of the import in quantity, but about one-fifth of the value. Germany and Ireland are the two chief producing countries per head of population, the average exceeding in both 0·6 ton per head. About one-fifth of the potatoes produced in Germany is used for the manufacture of alcohol almost entirely for industrial purposes, and considerable quantities are also used for the manufacture of starch.

One great objection to the cultivation of the potato, it may here be mentioned, is its liability to disease, which in some years, as in 1845–46 in Ireland, has caused great distress in those countries which depend mainly on this crop. Great progress has, however, been made with disease-resisting varieties. Thus, formerly, potatoes would not thrive in the Fenland of eastern England, now the largest potato-growing tract in the country.

OTHER VEGETABLES. Amongst other vegetables which enter considerably into international trade may be mentioned onions and tomatoes. Onions are imported into Britain from

various European countries (above all, Holland). Tomatoes now rank in importance with potatoes as imports. Other vegetables —turnips, mangolds, carrots, and parsnips, &c.—are for the most part of too little value in proportion to their bulk to bear the expense of distant transport, and hence are chiefly produced at home, turnips alone occupying in the United Kingdom an area four-fifths as large again as that devoted to potatoes.

FRUITS OF THE TEMPERATE ZONE, including nuts and edible seeds. Of all the familiar fruits suitable to a climate like that of England, by far the most important in the foreign commerce of the country is the **apple,** which is largely imported from the continent of Europe, and still more largely from North America, including both the United States and the Dominion of Canada. Australia and New Zealand have recently begun to contribute a portion of the supply. Notwithstanding the fact that there are over 250,000 acres in England and Wales alone occupied by fruit-trees (chiefly apple-trees), the quantity of apples imported is not far short of that of oranges. There is also a considerable import of pears and plums and a smaller import of cherries, gooseberries, raw currants, and strawberries. A large proportion of the modern trade is in tinned or canned fruits.

But the bulk of the fruit-trade of the United Kingdom is in fruits from warmer climates—of lands with a Mediterranean climate or from the Tropics, which cannot be grown at home. The principal fruits comprised under this designation are the citrus fruits (oranges, grapefruit and lemons), grapes, currants and raisins, figs, almonds and other edible nuts, chiefly walnuts and chestnuts.

The **orange** (*Citrus aurantium*, Risso) is believed to be a native of China, where the tree is still cultivated with great care in the southern half of the country. From China it had already spread to other parts of southern Asia before the discovery of the sea-way to that part of the world, and from some part of southern Asia it was introduced into Europe by the Portuguese in 1548. It is now cultivated in several varieties in a great many places in the tropical and sub-tropical parts of the whole earth, reaching its most northerly limit in Europe owing to the peculiarly favourable climate of the Mediterranean region. Its northern limit in North America extends in the west (in California) to about lat. 37° N., in the east to about 31½° N.; the bulk of the production is from California and Florida. In Europe its northern limit rises in western Portugal to about 40° N., and then, except in the valley of Andalusia, merely skirting the coast of the Iberian Peninsula, ascends to its highest, about 44° N., in the north-west of Italy. In Asia it begins in the west about lat. 37° (a degree and a half south of Smyrna), and sinks in the east to about 34°. In the southern hemisphere, the limit is about 37° S. Brazil has recently become the second largest exporter (after the United States). The other species of the genus of com-

mercial importance are the **lemon** (*C. limonum*, Risso), the smaller-fruited **lime** (*C. limetta*, Risso), and the large thick-rinded **citron** (*C. medica*, Risso). The last species was the first to be introduced into Europe (not long after the beginning of the Christian era), and owes its specific Latin name to the fact that it was known to the Romans as a tree abundant in Media (the tract on the south-east of the Caucasus). All the species appear to be native in India. A hardier species of the genus is the kumquat (mandarin) of Japan (*C. japonica*, Thunb.), which is grafted on a wild stock that remains uninjured by frost. It yields a small fruit resembling the orange in flavour, though slightly bitter. Of recent years the larger fruited **grape-fruit** has become of considerable importance in commerce, and is largely cultivated in California, Florida, and South Africa.

Formerly almost the entire quantity of oranges and lemons imported into the United Kingdom was derived from Spain and Italy—the lemons more particularly from Sicily. The supplies were only available during one season of the year. Now oranges are available throughout the year and are derived not only from the old sources in Europe but also from the United States, Brazil, Palestine, South Africa, Australia, the West Indies and elsewhere. As regards quality, the Maltese, Jaffa, Azores (St. Michael), and West Indian oranges were the most celebrated, the last being considered by some to surpass those of all other places, but many varieties have been perfected in the newer countries. In India the oranges of Nagpur and the Khasi Hills have a high reputation, in the Argentine Republic those of Tucuman. **Limes** are grown for export, and for the making of lime-juice, more abundantly on the West Indian island of Dominica (formerly in Montserrat) than in any other place.

Figs can be cultivated in the Mediterranean region over a somewhat wider range than the orange, the tree which produces this fruit not being so sensitive as the orange to frost ; but as a matter of fact they are grown for export mainly in the eastern part of the Mediterranean, and above all in Asia Minor, in the district lying to the north of those to which the orange is confined. The valley round Smyrna (Izmir), which carries on no orange cultivation, produces figs of peculiarly fine quality. Greece also produces excellent figs, both on the islands and the mainland ; and so also does southern Italy. The necessity of cheap labour for packing the figs, which are exported almost exclusively as a dry fruit, is no doubt an obstacle to the cultivation of the fig, especially in those regions which are suitable also for the more valuable orange. The **apricot** is said to be to Syria what the fig is to Smyrna and Ephesus, but the improvement in methods of drying and, above all, the growth of canning have made this fruit, together with the peach, of great importance in the newer ' Mediterranean ' lands of California, South Africa, and Australia.

Grapes are of course produced wherever the vine is grown, but they are exported as a fruit chiefly from those districts which do not produce a grape suitable for wine-making. Large quantities of table-grapes are grown in this country, and elsewhere beyond the limit of regular vine-culture, in hot-houses or under glass. They are also imported from Spain (especially the south-east) and Portugal, and to a small extent from other countries. **Raisins** and **currants** are dried grapes. Raisins are imported into this country chiefly from the United States, Australia, Asia Minor, and Spain. Formerly Spain and Asia Minor supplied the bulk. **Sultana raisins** are made from a seedless grape largely cultivated in Asia Minor and on some of the adjacent islands. **Currants** are the dried form of a still smaller seedless grape obtained from a variety of vine which appears to be one of the most exacting of all plants as regards soil and climate, and one that exhibits in the most marked manner the effect of local influences. The currant-vine is almost confined to the kingdom of Greece, and its product is the most valuable of all the exports of that kingdom. But even in Greece its domain is limited, and it is observed that, however carefully the vine may be cultivated, it is impossible to get an equally good fruit in all the different districts in which it is grown. The smallest, but sweetest and best flavoured currants are grown on the islands, and on the mainland it is observed that the best qualities are grown only at the head and on the south shore of the Gulf of Corinth. It was on this gulf, in the neighbourhood of the town of Corinth, of which the name currant is a corruption, that this variety of the vine was first cultivated on the Greek mainland. In recent years the output has been carefully restricted, but competition has arisen from certain of the ' newer ' countries where currants (and likewise sultanas) are now successfully produced (*e.g.* Australia).

Almonds, walnuts, and **chestnuts**—all, it would appear, originally products of the interior of Asia Minor, in the neighbourhood of the Black Sea—have all spread far west, and more or less north. Almonds are now chiefly imported into Britain from Italy, Morocco, and Spain, but are also produced in considerable quantity in France; and walnuts and chestnuts have penetrated much farther into the heart of Europe and make up a large part of the nuts used as fruit which are imported into this country chiefly from Spain and France. Among other southern fruits of slight importance in commerce are the **prickly pear,** the black-spotted pear-shaped fruit of a cactus, introduced into southern Europe from the drier parts of tropical America; the **black mulberry,** the **pomegranate,** and the **pistachio nut.**

WINE. From a geographical point of view, and more particularly, as will appear further on, from the standpoint of commercial geography, the vine is one of the most interesting of all

economic plants. Its original home seems to have been somewhere in western Asia or the south-east of Europe. According to Hehn, the region from which it spread is the luxuriant country to the south of the Caspian Sea, part of the ancient Media. 'There in the woods the vine, thick as a man's arm, still climbs into the loftiest trees, hanging in wreaths from summit to summit.' [1] But it appears to be indigenous as far east as Afghanistan and as far west as the Carpathians.[2]

How early the must, or juice of the grape, was converted into wine we know from the Hebrew Scriptures; and the virtues of this product in process of time caused the spread of vine-culture wherever civilisation advanced along the shores of the Mediterranean, as well as eastwards through the drier parts of Asia. By Europeans the vine of the Old World was introduced into America, where, however, there are native species (*Vitis labrusca*, L., &c.), now cultivated as wine-plants. The spread of vine-cultivation is still going on, and the vine thus rapidly extending over the whole domain suitable to it throughout the world.

The limits set to its cultivation by climate are somewhat rigorous; for though there are many varieties of the vine, as of all cultivated plants, there are none adapted—like some varieties of maize, for example—to a comparatively short summer. A moderately high temperature, extending far into the autumn, is essential to the maturing of the grape, so as to make it fit for wine-making. In Europe, a mean temperature of about 60° Fahr. in the month of September is one of the conditions of successful cultivation; and it is this fact chiefly which explains the form which the northern limit of the vine as a wine-plant assumes in both the Old World and the New. In western Europe, where the temperature is subject to moderating influences both in summer and in winter, the northern limit is in about 47½° N., a little to the north of the mouth of the Loire, but it gradually rises eastward as the summers get warmer, until in the western part of the republic of Poland it reaches its highest latitude anywhere in the world, about 52½ or 53° N. As we go still further east the summer in equal latitudes gets shorter though warmer, and hence the September temperature declines. Consequently, the wine-limit gradually sinks to the shore of the Sea of Azof, where it is further south than in the west of France. The extremely sunny character of south-eastern Russia causes it, however, once more to rise a degree or two, but it again sinks in Asia to about 40° or 41°. The corresponding limit on the American continent has a similar

[1] Hehn's *Wanderings of Plants and Animals*, p. 73 (Eng. ed.).

[2] Remains of vine-leaves have been found in prehistoric tuffs at Montpellier and elsewhere in the south of France, and grape-pips round the lake-dwellings of Switzerland, while fossil relics both of the vine and fig (*Ficus carica*) have been found in the Quaternary travertine of Miliana in Algeria.

form, but exhibits the advantage belonging to Europe in respect of climate. It begins in California about 37° N., rises to above 42° N. in the Canadian province of Ontario (owing partly to the moderating influence on climate exerted by the great lakes), but declines again slightly in the United States. In the southern hemisphere the limit is about 40° S.

But while the range of cultivation of the vine is thus limited on the north and south, it is important to observe that the habit of the plant gives it one great advantage within those limits. The roots of the vine-stock penetrate the soil to a great depth ; and this fact, besides placing the roots beyond the reach of frost, which is important in those regions in which a summer of sufficient length is succeeded by a winter of great severity (as in some parts of Russia and central Asia), enables it to draw on deep stores of moisture, and thus without irrigation to flourish and to continue to produce its tender leaves, even in those parts of the Mediterranean in which the summers are nearly rainless and almost all other vegetation is then at a standstill.

Lastly, with respect to the range of the vine as a wine-plant, it is to be noted that the limits above described are not fixed solely by climate. They are fixed partly by commerce. They are not the limits within which the vine can grow and yield grapes whose juice can be made into wine, but the limits within which wine of tolerable quality can be produced—that is, wine sufficiently good to have a commercial value. In former times the vine was cultivated as a wine-plant in the valley of the Severn, and in several of the southern counties of England, as well as north of its present limits on the mainland of Europe, but the advance of commerce bringing better wines from more favoured regions has caused vine-growing to be given up in those places. It was only the employment of a large amount of capital for the production of wines of high quality that made it possible for the Marquess of Bute to grow the vine for that purpose near Cardiff with good results in favourable years, and in the end the experiment was given up.

The amount and quality of the wine obtainable from grapes in different places vary greatly from different causes. In the first place, the fruit of the vine is greatly affected by differences in the soil and climate. A sunny climate without excess of rainfall is that which is best adapted to it, and hence it is often grown, especially in the more northerly districts, on hill-slopes exposed to the sun, the slope favouring the draining away of superfluous moisture. The excess of summer rains prevents the cultivation of the vine for vine-making in monsoon countries such as India and China. The best soil for the vine is one both warm and retentive of moisture—that is, one that retains enough moisture without being wet ; and it is, no doubt, the combination of these characters that makes chalky and other limestone soils so suitable for viticulture. But, secondly,

the preparation of wine of high quality from the must is an industry that demands great skill and experience, and consequently is practised on a great scale only where the industry is of long standing, and where the state of industry is sufficiently advanced to afford the necessary capital and labour. And, thirdly, the vine is subject to many diseases, some of which have at times committed such ravages in vineyards as greatly to reduce, and occasionally almost to extinguish, the wine industry in certain districts. A fungus (*Oïdium Tuckeri*, Berk.) has since about the middle of the nineteenth century committed extensive ravages in the Mediterranean region and almost destroyed the once famous vineyards of Madeira. Since about 1863 the vines of France and many other countries have suffered even more severely from an insect enemy—the now well-known phylloxera. In France alone upwards of a million acres of vineyards were reported to be infected by the disease due to this insect in 1885, and more than 2,000,000 acres had already been destroyed. Numerous vineyards have been replanted with American vines, not so liable to the attacks of the insect. The maximum area under the vine in France was that of 1875—about 5,980,000 acres. In 1902 it had fallen to about 4,334,000 acres, but at the latter date the vines were stronger, and in normal years much more productive relatively to area than at the height of the phylloxera ravages (about 1890). In recent years the acreage has been roughly 3,700,000.

The table on p. 142 will serve to indicate roughly the relative place of different wine-producing countries, and the changes that have taken place in recent years. It must be remembered, however, that vintages are very variable, in consequence of variations in the weather, as well as the attacks of the pests above named. In France, for example, the yield varies between extremes of about 100 and above 300 gallons per acre. On the average of the ten years 1876–85 the production in that country was 940 million gallons, but the production in 1875 was more than twice that average. The table gives an interesting comparison between a pre-War period, a War period, and a post-War period.

France does not only take the first place as regards the quantity of its wine-production. Its most celebrated wines—such as the **clarets** or Bordeaux wines, from the best vineyards of the basin of the Gironde; **champagne**, grown on the chalk hills of the old province of that name; and **burgundy**, named from another old province—are among the best of old wines. The last named is grown at its best on the 'golden' slopes of the Côte d'Or, where that range looks down on the warm valley of the Saône, a valley sheltered from cold northern blasts by the Vosges Mountains and the heights of the Faucilles. France, as it has the largest wine-production in the world, has also the largest export trade in this commodity. Until

the ravages of the phylloxera began there was only a trifling import to set against this large export, but since 1880 the wine imported into France has exceeded in quantity the amount exported, and the amount of the import is now regularly between three and five times that of the export. There is not, however, the same difference in value, the imported wine being chiefly an inferior commodity from Algeria, Italy, and the north-east of Spain. The explanation of this large import is twofold. First, the fixed habits of the people lead to a larger consumption of wine per head in France than in any other country, and hence demand an increased import when the amount of the home product is diminished ; and, secondly, France retains the reputation which it has long had in foreign countries, and especially in England, for its light wines, and hence there is a constant demand abroad for French wines.

Average Annual Wine Production.

	Million galls. 1901–5.	1914–18.	1926–30.		Million galls. 1901–5.	1914–18.	1926–30.
France	1,126	878	1,194	Bulgaria	44	17 [6]	39
Italy	840	819	489	Greece	?	66 [7]	56
Spain	390	417	501	Switzerland	26 [8]	11	12
Austria	179	23 [2]	11	Czechoslovakia	?	10 [6]	4
Hungary	179	?	48	Algeria	136	162 [5]	236
Portugal	105 [1]	93 [3]	132	Union of S. Africa	4 [8]	12 [9]	12
Germany	74	36 [4]	31	Australia	6	6	19
Russia	31 [10]	?	?	United States	31 [8]	?	nil
Roumania	28	28 [5]	134	Argentina	—	99	144 [11]

[1] 1901–3. [2] 1917–18. [3] 1915–18. [4] Yield of former Empire, but exclusive of Alsace-Lorraine. [5] 1914, 1915, and 1918. [6] 1918 only. [7] 1914–17. [8] 1901–4. [9] 1917–18 and 1918–19. [10] 1909–13. [11] 1926–28.

Of the **wines of Italy**, though some were celebrated in classical times, only a few are in any favour abroad ; one of the best known is Chianti. Some of the **Spanish wines** have long been in high repute, especially in England, the most noted being those strong southern wines which take the name of **sherry** (formerly sherris) from the town of Jerez de la Frontera, near the seaport of Cadiz, in which district the best sherry is still produced, as it was in the days of Falstaff. A greater quantity of wine, however, is produced in the north-east of Spain, in the provinces of Barcelona, Zaragoza, &c. The wines of **Portugal** are, except light wines near Lisbon for local consumption, chiefly grown in the basin of the Douro, and that which is exported is shipped at Oporto, chiefly for England, where it is known as port. Indeed, by law, the name 'port' may not be used except for these wines. Of the wines of Central Europe the most celebrated are those of **Hungary** (especially Tokay). **Germany**, though only sixth on the list in respect of the quantity of wine which it produces, is noted for the fine quality of the vintage of some of its valleys, and above all those of the warm valleys of the middle Rhine and its tributary streams, the Moselle and the Neckar. The celebrated

Taunus wine is grown on the slopes of the hills that shut in on the north the broad flat valley between the Vosges and the Black Forest.

In the **United States** the cultivation of the vine has not attained the extent that might have been expected from the vast area which they afford with a suitable climate; but has received attention, especially in **California** in the west and New York in the east. During the period of prohibition the manufacture of wine was forbidden and thousands of acres of wine-grapes were destroyed, but in 1924 there were 382,000,000 vines for raisin-grapes. California has specialised in small seedless raisins. The repeal of prohibition in 1934 has given a new impetus to vine cultivation. In **Algeria** the spread of the vine-culture since 1878, when it was in its infancy, has been very rapid. The vine was introduced into what is now the **Cape Province** in 1653, soon after the arrival of the first European settlers. The part of South Africa where the first settlements were made has a climate very similar to that best adapted to the vine in Europe, and there it has proved very productive. Large quantities of the fruit are used as table grapes or converted into raisins. The production of wine has increased and, in addition to a considerable home consumption, wines of the hock, claret, and burgundy types are popular in England. A proportion of the grapes is also used in making brandy and other spirits, but the production under this head has greatly declined. There are several government vineyards where experiments are carried out. The **Australian** production of wine is increasing, and several wines of that origin, especially of the burgundy and port types, have already found favour in the home market. South Australia, Victoria, and New South Wales are the chief states in which the vine is grown.

The **British trade** in wine is affected by the existence of a customs duty which varies according to the proportion of spirit contained in the wine. The countries from which the greater part of the British import is derived are France, Spain, and Portugal, despite a recent preferential tariff in favour of Empire wines. A considerable proportion of the wine imported is re-exported, being sent to all parts of the world. The quantity of wine retained for home consumption in the United Kingdom, relatively to population, steadily declined from ·56 gallon per head in 1876 to ·30 gallon per head in 1886, which remained the minimum down to 1900 but which is approximately equal to the present figure. For the sake of comparison it may be mentioned that in France the consumption in 1876 was rather more than 30 gallons per head; but that, it must be remembered, was the year after the unparalleled crop of 1875. In the year following the rate was reduced to 28 gallons, and even declined still further, but of recent years has been between 35 and 40 gallons, even exceeding the latter figure.

HOPS. The hop-vine is a slender-stemmed, twining and climbing plant cultivated for the sake of its clusters of small greenish flowers, which are used as a seasoning for beer, to which they impart a bitter flavour. In cultivation it is allowed to twine round upright poles or cords or wires. There are two kinds of flowers on different plants, one which can and one which cannot produce seeds, and it is only the former that can be used for the purpose mentioned. The countries in which the plant is most largely cultivated are England, Germany, the United States, and Czechoslovakia. The average yield is very variable, but is always higher in England than in Germany.[1] Notwithstanding its large production, the United Kingdom regularly imports an amount equal to one-third of the home produce or more, the export being trifling. This fact might be expected to lead to still further increase in the extent of this crop, but the obstacle to any great extension consists in the fact that the crop is a very exhausting one, requiring to be grown only on the richest soil and needs a plentiful labour supply at the time of harvest. It is hence confined to only a few localities. In England, it is mainly grown in the weald of Kent, where ' hop-pickers ' drawn from the poorest districts of eastern London combine work with a summer holiday. Besides Kent, the principal county producing this crop is Hereford. It is not grown at all in the northern counties. Besides being grown only on rich soil, the crop is in England generally very plentifully treated with manure, so that the average quantity produced to the acre in this country is very much greater than the average produced anywhere else. The imported hops are mainly from the continent of Europe and the United States. In Germany hops are chiefly grown in Bavaria, and above all in the division of Middle Franconia. Of late this crop has extended very rapidly in Alsace-Lorraine. In Czechoslovakia the chief hop-growing area is the Czech or Bohemian plateau such as around the famous beer-brewing centre of Plzn or Pilsen. The hop as a cultivated plant was introduced into England from Belgium (Flanders) only in 1525.

BEET. This is the common name for several varieties of a species of plants called botanically *Beta vulgaris*, Linn., and largely cultivated. They have large broad leaves and long tap-roots, and it is principally for the sake of the latter that they have been introduced into agriculture. One variety is extensively grown in this country, under the German name of **mangold** or mangel-wurzel, as food for cattle, like the turnip. Requiring a hotter and drier climate than this latter crop, it is mostly grown in the southern and eastern parts of England, and, being sensitive to frost, it is banished

[1] In the ten years 1904–13 the average yield varied in England from 5·26 to 14·21 cwts. per acre, in Germany from 1·67 to 6·02. In 1924 the English yield exceeded 16 cwts. per acre, but in 1930 dropped to 12·6.

from those parts of the island in which the summers are short or the situation too exposed.

Another, and now a much more important variety, the sugar-beet, became in the course of the nineteenth century the great rival of the sugar-cane in the production of sugar. This variety is now cultivated over a very large and steadily increasing area in central Europe, stretching from France, through Holland, Belgium, Germany, Czechoslovakia and Poland to Roumania and South-western Russia (the Ukraine). Under the protection of high duties sugar is extracted and refined in the United States from beets grown in many states in the north and west, and there are now hardly any parts of the world with a suitable climate in which sugar beet is not cultivated. As to British experiments see p. 303. See also the Sugar Industry, p. 197.

FLAX. Flax is a plant remarkable for the variety of useful products which it yields, as well as the variety of uses to which these products can be put, and hence is well called by botanists *Linum usitatissimum*, Linn. The most important of these products is the fibre of the bast, or inner bark of the stem, which is tall and slender like that of the cereals, but not unbranched. The fibre, which is from eight to upwards of fifty inches in length, is itself called flax, and from the earliest times has been spun and woven into a fabric known as **linen** (from the Latin name of the plant). Manufactured flax fibres have been found in the remains of the pre-historic lake-dwellings of Switzerland. The oldest of all surviving vestments, the wrappings of the Egyptian mummies, are probably linen. The seed (linseed) is also of great value as yielding an oil largely used in making paints, and, in its greatest purity, in making varnish. The crushed cake that remains after pressing out the oil is an excellent food for cattle, and the seeds when ground afford the linseed-meal which is so much used medicinally. The tow, which is composed of the shorter fibres of the flax, those not used for weaving, is spun into twine and cords, and linen rags furnish one of the best materials for paper-making.

Flax is grown through a wide range of climate. It thrives both in India and in the colder parts of Russia, but the chief commercial value of the crop arises only from one of its two products, either fibre or seed, not from both together. Where, as in India, the best seed (for oil) is grown, the fibre is nearly valueless ; and where the fibre is good, as in Russia, the seed is of less value, though in that country flax is grown both for the oil and the fibre. In Europe flax is grown most extensively in Russia, from which more than three-fourths of the entire British import were formerly derived; but the best quality is that of Belgium. In Great Britain flax is now but little grown, but flax of excellent quality is still grown in considerable amount in the north-east of Ireland, in the whole of which

island it is a culture of great antiquity. There the flax is not allowed to produce seed even for sowing, and the seed for this purpose is imported mainly from the Baltic countries but partly from Holland. British supplies of raw material are now derived from Belgium, Latvia, Estonia, and Lithuania.

The soil best suited for the growth of flax for the fibre is one that is tolerably firm and moist. This latter circumstance is what renders the flat surface of Russia and Ireland so well suited for its growth. But there are other conditions besides soil and climate which have an important influence on the extent of flax cultivation. Flax is one of those crops which require the employment of a good deal of labour on the field before the fibre is ready for the factory. For the unprepared flax straw there is in England no market, and to be made ready for the market the flax has to undergo a number of processes which are apt to make extensive demands on the labour attached to a farm at a time when it is much needed for other purposes. In the first place, instead of being cut like grain, flax has to be pulled up by the roots. Next, if it has been allowed to seed, it must be rippled—deprived of its seed-vessels by means of an iron comb. After that the straw has to be retted, that is, steeped in water for about a month so as to rot the soft tissue but leave the fibre and the woody core. The quality of the fibre depends largely on this operation, for which the water should be soft and stagnant or nearly stagnant. In Russia an inferior fibre is sometimes prepared by dew retting. Finally the straw is scutched, or subjected to the action of a machine with revolving blades, which gets rid of the woody core of the fibre.

It is the labour required for these processes that chiefly prevents the cultivation of flax in England and Scotland ; but in view of the fact that the plant is quite suited for our climate, that the average value of the imports of flax-fibre, linseed, and oil-cake (chiefly from linseed) into the United Kingdom is about £6,000,000, and that other branches of agriculture are declining in this country, an effort was recently made, but not very successfully, to extend the growth of flax among British farmers by making them acquainted with recently invented modes of saving labour. In the United States flax is extensively cultivated, but almost exclusively for seed, the cost of labour for the preparatory processes being, no doubt, as in Great Britain, the chief cause preventing its cultivation for the fibre ; for that country is one of the most important in the world for linen goods, and a linen manufacture, based on imported fibre, is one of steady importance.

Of the different flax products imported into the United Kingdom, that which has the greatest aggregate value is linseed ; but the amount of flax fibre, including tow, annually imported is itself equal to the produce of 300,000 acres, or more than ten times the

acreage under this crop in Ireland. This betokens an extensive linen industry, the chief seats of which are the north-east of Ireland around Belfast and at Dundee and Dunfermline, Scotland. On the continent this industry is most highly developed in Germany (where Westphalia is most noted for the quality of its linens), Czechoslovakia (especially Bohemia), and Belgium.

Lawns and **cambrics** are among the special fabrics made from flax. The latter is named from the French town of Cambrai, where the manufacture is still carried on. The canvas of sail-makers, formerly, as the name (see below) indicates, made from the hemp-fibre, is now, in the United Kingdom at least, made chiefly from flax or cotton.

HEMP (*Cannabis sativa*, Linn.) is a plant the bast of which yields a fibre similar to that of flax, only coarser and stronger. It is hence used chiefly (in England almost solely) for ropes and cordage, and the fabric woven from it, which takes the name of canvas, from the Latin name of the plant, is principally used in making sails. The finer kinds of fibre are, however, used in making a cloth similar to linen, and hemp yarn, like linen yarn, is frequently combined with other yarns in weaving. Like flax, hemp is adapted to a wide range of climate ; but the soil and climate best suited to it, when grown for the sake of the fibre, are similar to those required for flax, and the mode of cultivation and after-treatment of flax are likewise suitable for hemp. Hence the countries of chief production are the same. Russia stands first as regards quantity, but Italy, which comes second in quantity, has the reputation of producing the hemp of the finest quality (that grown round Bologna). In the United Kingdom hemp is even less grown than flax, and is now rarely seen. In India hemp is very extensively grown, but chiefly for the sake of various stimulants derived from it.

The term ' hemp ' is also applied to a number of other fibres, some tropical, some extra-tropical in their origin, adapted to the same uses as the true hemp fibre. By far the most important of these is that known as Manila hemp, a tropical product, and among other tropical products so called are sunn-hemp, deccani-hemp, and sisal-hemp. Among plants belonging to temperate climates, the so-called **New Zealand flax** (*Phormium tenax*, Forst.) is now sometimes more appropriately called New Zealand hemp, seeing that the fibre is much better adapted to the purposes of hemp fibre than to those of flax fibre. In this case the fibre is derived from the leaves, which are long and narrow like those of the yellow flag or iris. The plant grows very abundantly in New Zealand and is very easily cultivated, and as the leaves can be cut thrice a year without destroying the plant, it might be expected that the supply of the fibre would be plentiful. It thrives on inferior boggy soil, almost useless for other purposes, and it has been grown in several of the south-western

counties of Scotland. The use of the fibre in manufactures is, however, impeded by the difficulty in freeing it from a gum by which it is invested.

Of the other fibre-yielding products of the temperate zone, the most important are the **common nettle** (*Urtica dioica*, Linn.) and **esparto.** The bast fibres of the former were fairly extensively used in spinning and weaving on the continent of Europe before the great expansion of the cotton industry about the beginning of the nineteenth century, and their use has recently been revived to some extent in Germany and elsewhere. The cloth made from it is known as **grass-cloth,** in the making of which, however, the tropical or subtropical fibres ramie and China-grass are the materials principally employed. **Esparto,** or, as it is called in North Africa, **alfa,** is the commercial name of various grasses (chiefly *Stipa tenacissima*, Linn., but also *Lygeum spartum*, Loefl., and *Ampelodesma tenax*, Linn.), derived from northern Africa (Algeria and Tunis) and southern Spain, and used chiefly in paper-making. In Spain esparto fibres are also employed in making ropes and cordage as well as in plaiting.

WOOL. Wool is the name given to a kind of hair found in greater or less quantity on almost all mammals, on a few of which it forms the principal covering of the body. From ordinary hair it is distinguished by two important properties. First, while a hair is almost quite smooth on the outside, each fibre in wool is covered with minute overlapping scales, the edges of which are turned in one direction like those of the slates on a roof. These scales are, however, extremely minute, so that they cannot be discerned by the naked eye or by the touch, unless a woollen fibre be drawn between the fingers in the direction opposite to that in which the edges of the scales are set. Second, each fibre of wool is finely crimped or curled, so that when drawn out it becomes greatly lengthened, returning again to its original length when the strain is removed. It is the spring due to this curl which imparts to woollen fabrics that elasticity which distinguishes them from those made from cotton, linen, and other fibres. Another distinguishing property of wool is its power of felting—that is, of becoming matted in such a manner as to be capable of being made into a kind of cloth without weaving, but merely by rolling, beating, and other processes.

The animal that furnishes by far the largest proportion of the wool of commerce is the domestic **sheep,** the woolly covering of which is almost entirely a product of domestication. Several different species of wild sheep are indeed known, one of these, the mouflon, still surviving in a few of the mountainous parts of southern Europe; and some of the species of wild sheep which inhabit the elevated regions of central Asia are known to produce, like other natives of the same part of the world, considerable quantities of winter wool. But no wild species of sheep possesses the well-known

woolly fleece, which is one of the principal products for the sake of which the domestic sheep is reared. When the sheep was first domesticated it is impossible to say. This must have taken place at a period beyond the reach of history. The pictures on the ancient Egyptian monuments bear witness to the fact that the people of that country possessed the domestic sheep at a very remote period, though there are no pictures of this animal so old as some of those of the horse and ox.

In all countries suited for rearing it, the sheep is now the most numerous of domesticated animals, and in most of these it is chiefly for the sake of the fleece that it is reared. The climate best adapted to the sheep as a wool-producer is one that is comparatively dry and equable, or at any rate free from extremes of cold. The grassy tracts of the Mediterranean countries are accordingly peculiarly favourable to it, and it was in that region that the merino sheep, the variety which now produces fine wool in all parts of the world in which it thrives, originated. This variety, which is characterised by its dense and soft fleece, and fine but strong and very curly fibre, was first known in northern Africa, and was thence introduced into Spain about the middle of the fourteenth century. In Spain, which even in Roman times was renowned for the excellence of its fleeces, the variety was still further improved by careful rearing. In the seventeenth century the finest cloths of western Europe were all made from Spanish wool, and Spain retained its reputation for wool till long after that period. At the present day, however, Spanish wool, owing to the neglect which the sheep-rearing industry along with others experienced for centuries in Spain, is far eclipsed by the produce of other countries, and in quantity it takes a very unimportant place in the commerce of the world.

The country which first bore the palm from Spain for its wool was Saxony, into which the merino sheep was introduced towards the middle of the eighteenth century. Upon the rearing of this variety the Saxon sheep-owners bestowed the greatest care, and in consequence of that care, rather than because of any superiority in climate, the so-called 'electoral' [1] wool rapidly attained the first place in the market. Silesian wool, produced in the Prussian province of Silesia, soon came to rival it from the same cause, and another rival is sometimes found in Bohemian (Czechoslovakian) wool. With regard to English wool, it must be explained that wools generally are classed in two great divisions, adapted for different purposes, the length of fibre or staple having been formerly the distinguishing character between the two, and it is mainly the long-stapled variety for which English wool has a reputation. The

[1] So called because in the eighteenth century Saxony was an 'electorate'—that is, its ruler was one of the princes entitled to vote in the election of the emperor of the old German Empire.

English breeds of sheep which take their names from the counties of Leicester and Lincoln are among the finest of the 'long-stapled' class. To illustrate the effect of local conditions on the quality of sheep's wool, an effect which is very marked in many parts of the world, it may here be mentioned that, while these breeds produce in the counties named, and in Yorkshire and Nottinghamshire, a highly lustrous wool, their fleece rapidly loses in brilliancy in other counties. In the Middle Ages wool was by far the most valuable of the English exports. It is still the principal agricultural export of the United Kingdom, and till recently this export tended to increase greatly in absolute, and still more in relative, amount, as is shown by the following table :—

Period.	British wool, average annual amount in millions of lbs.		Percentage exported.
	Production.	Export.	
1871–75	159	9	6
1876–80	152	12	8
1881–85	133	18	13
1906–10	136	40	29
1911–13	130	34	27
1931–35	115	63	55

The following table, giving an estimate at different dates of the production of wool in different parts of the world, will serve to show where the tendency is upwards and where downwards, at least so far as the wool of international commerce is concerned :—

—	Production in millions of lbs.					Sheep Million.
	1873.	1885.	1900.	1909–13.	1931–35.	1931–35.
Australia }	193	385	514	700	1,008	112
New Zealand }				198	285	29
Union of South Africa [1]	49	50	46	158	280	45
Argentina }	248	356	398	359	360	40
Uruguay }				157	109	20
United States	175	330	301 [2]	314	450	53
United Kingdom	165	136	141	134	116	27
Russia (U.S.S.R.)	—	—	—	320	150	75
World total	1,425	1,830	2,025	3,187	3,760	700

NOTE.—Production estimated on a greasy basis. Roughly $2\frac{1}{4}$ lbs. of greasy wool equal 1 lb. scoured and cleaned.

[1] 1873, 1885, 1900, Cape of Good Hope only. [2] North America.

The estimation of wool production on a greasy basis in the preceding table greatly modifies the value of these figures for comparative purposes. The wool on the sheep always includes a varying proportion of grease and dirt, which must be removed before the wool is ready for use. Each fibre of the wool has a natural covering of grease, which is known as the yolk, and which on the living animal has the important property of preventing the wool from becoming felted. Occasionally the wool is scoured before export, but this practice, which is apt to result in the felting of the wool when packed in bales for long voyages, is becoming rarer. More frequently the fleece is washed to get rid of the dirt, the yolk being still retained. Very often, however, the wool is exported in its natural condition. The amount of clean wool, that is, the amount of fibre available for manufacturing purposes, thus varies greatly according to the difference of practice in this respect, as well as according to other circumstances affecting the condition of the wool.

Merino sheep were introduced into Australia about the close of the eighteenth century, and care has been taken to propagate them. They have thriven admirably, and certain parts of Victoria and New South Wales now produce a wool unequalled for softness and lustre, and at the same time, unlike the original merino, very long in staple. This wool now commands the highest price in the London market. As the merino sheep, however, yields very poor mutton, the growth of the trade in frozen lamb and mutton has led to the rearing of increasing numbers of sheep crossed with English breeds, yielding better mutton, and producing a different variety of wool.

For the Australian and South African wool the principal market is the British Isles, which derive from the Dominions of the Southern Hemisphere, and also from Argentina, a steadily increasing proportion of the wool required for the home manufactures. The different branches of the British woollen industry now make use of more than five times as much imported as home-grown wool. Of the total quantity of imported wool (including that which is re-exported) that of Australasian origin increased from an average of 60 per cent. in the ten years 1866–75 to nearly 70 per cent. in the ten years 1891–1900. In 1911–13 it was 64 per cent.; in 1921–23, 64·5 per cent.; in 1935, 63 per cent. As in Australia, large numbers of cross-bred sheep have come to be reared in recent years in Argentina. A great deal of the best blood of British breeds has been introduced into the country, and the cross-bred wool of that country is now unsurpassed. The chief markets for the River Plate wool are the United Kingdom, Germany, the United States, France, Italy, and Belgium. Formerly River Plate was considered 'dirty' and went to continental Europe: this whole position has now changed.

In the latter part of last century London was almost the sole

market for Australian wool, but now the bulk of the wool is sold by auction in the chief Australian capitals. One result of this is that a large proportion of the wool from that part of the world is sent direct to Antwerp, Marseilles, Hamburg, and New York. In recent years between 80 and 90 per cent. of the wool grown in Australia is normally sold in the local market prior to export. In 1895 only 50 per cent. was sold thus.

In the United States the production of wool does not meet home needs, and there is an import, mainly of carpet wools from India, China, and Argentina, and also of the finest types (from Britain). The Union of South Africa, though falling below the United States or the La Plata region as regards the total amount of wool produced, yields a large quantity relatively to population, and its output rivals that of New Zealand. Several attempts were made to introduce fine-woolled sheep from Europe from about 1790 onwards, and about 1812 the rearing of merinos was fairly established in the colony. The South African wool is neither so fine nor so long in the staple as that of Australia and is sent in larger quantities to continental Europe (France, Germany and Belgium) than to the United Kingdom.

Among the other countries from which the British Isles obtain supplies of wool the most important are India (whence the wool obtained is generally of poor quality, and used chiefly for making carpets or blankets), France, Chile, and Turkey.

Other wools. The principal animals besides the sheep yielding materials for the woollen manufacture are the **goat**, the **alpaca** and **vicuña**, and the **camel.** The fibre derived from all of these is more nearly allied to wool than to hair, though there are gradual transitions between the properties of the one and those of the other fibre.

Of the varieties of goat, those most famous for their wool are the **Angora goat** and the **Cashmere** (Kashmir) **goat.** The former is a native of the steppes of the interior of Asia Minor, and its wool, known as **mohair,** is remarkable for its length, fineness, softness, and silky appearance. The goat has been introduced with great success into **South Africa,** and mohair has long been an important export of the Union of South Africa. The **Cashmere goat** is the animal that furnishes most of the material for the costly Cashmere shawls, so called from having been first made in the kingdom of Cashmere or Kashmir. The material used in the manufacture is not the ordinary covering of the goat, but a fine downy under-covering which grows in winter on this and other animals (such as the yak) belonging to the higher slopes of the Himalayas.

The **alpaca** is an animal closely allied to the llama, and, like it, a native of the lofty plateaus of the Andes. It has long been domesticated for the sake of its wool, which is remarkably soft and elastic. This wool, though long used in spinning and weaving by

the Peruvians, was at first found to be unsuited for spinning by the processes now used in the great manufacturing countries; but the difficulties in the way of its being so used were at last (about 1836) overcome by Mr. (afterwards Sir Titus) Salt, of Bradford, who thereby founded an important industry.

The wool of the **vicuña**, another ally of the llama and alpaca, is of even more value than that of the latter animal, but, since the vicuña is found only at elevations above 13,000 feet, it is not domesticated, and the supply of wool from this source is consequently small and decreasing.

Camel's hair, formerly used chiefly for making painters' brushes, is now employed in the manufacture of coarse shawls, carpets, blankets, and other fabrics, the yarn made from it being usually mixed, however, with other yarns. A fine and light-coloured camel-hair is imported from China, a coarser and darker-coloured kind from Russia, and as this latter kind is very strong and does not readily stretch it is largely used in making belting for machinery.

WOOLLEN MANUFACTURES. In point of antiquity the origin of the spinning and weaving of wool belongs to the same remote period as the industry in cotton and linen. In point of extent the woollen industry is, in temperate countries at least, the great rival of the cotton industry, and in most of them is the more important of the two. In temperate and cold countries, in which close-fitting garments are worn, wool is much the most suitable material for clothing, not only because it is a bad conductor of heat (due largely to the large amount of air occluded), and woollen clothes consequently retain the heat better than others, but also because moisture is less readily absorbed by the woollen fibre, and perspiration more readily passes through woollen tissues than through tissues of another kind. Where, as in the tropics, and in warm countries generally, clothes are worn more loosely, this circumstance is of less consequence. It is natural, therefore, to find that in all temperate countries, except China and Japan, wool is the principal clothing material, and its use is further promoted by the fact that such countries also furnish the raw material of the manufacture.

The treatment of wool in manufactures is in many respects like that of cotton, but some differences require notice. First of all the wool has to be thoroughly freed from the yolk or natural grease which invests it, since that would prevent it from taking the dyes, and otherwise interfere with the processes which it has to undergo. Dyeing may follow, and then the fibres may be oiled artificially to make them more easily workable. The nature of the next steps depends upon the use to which the wool is to be put, or more particularly upon the kind of yarn that is to be made from it. Formerly all long-stapled wools were combed, or so treated that the fibres were laid as nearly as possible parallel to one another, and were

then spun into a kind of yarn known as worsted, which is used in hosiery and in the manufacture of fabrics which have not to undergo the process of fulling. All short-stapled wools, on the other hand, were carded and spun much in the same way as cotton, and the yarns so made were the only ones capable of being used in making milled or fulled cloths, in which advantage is taken of the felting property in wool to thicken and shrink the cloth after weaving, and afterwards by means of teasels to raise the nap of the cloth in such a way that, in the most highly finished fabrics, a uniform surface is presented to view without any appearance of the intercrossing of fibres that takes place in weaving. All kinds of wool were therefore formerly divided into combing and carding or clothing wools, according to the purpose for which they were fitted. Machines have been invented capable of combing wools having a staple as short as one inch, and, on the other hand, wools with a staple of as much as five inches long may be used in making milled cloth. Wools are still divided into combing and carding or clothing wools, but the former term is no longer synonymous with long-stapled, the latter with short-stapled wools, and the distinction as between wools is no longer so absolute as it once was. But the distinction between worsted yarns and carded or clothing yarns still holds good, and it is to the industry concerned with the latter that the term ‘ woollen manufacture ’ is specially applied.

Among the principal varieties of woollen cloth in the special sense of the term are : (1) broadcloths, so called from the great width of the web, the finest quality of cloth ; (2) cashmeres, a fine thin twilled fabric, much used for ladies’ dresses ; (3) tweeds, a fabric of looser texture than broadcloth and less highly milled, first and still mostly made in Galashiels and other towns belonging to the Tweed basin, chiefly used for men’s clothing ; (4) doeskin, a strong twilled cloth also used for men’s clothing. Blankets, flannels, Scotch bonnets, and some kinds of shawls also belong to the woollen manufacture in the narrower sense of the term.

The name worsted is said to be derived from the parish of Worstead in Norfolk, which may therefore be presumed to have been one of the places where the making of worsted was first practised. Merinos and serges are among the chief kinds of worsted fabrics made entirely of sheep’s wool, but such fabrics are perhaps the exception among those in which worsted yarn is used, at least in the United Kingdom, this kind of yarn being mixed more frequently than carded yarn with yarns made from other materials. The fibres chiefly used for mixing with that of the sheep are mohair, alpaca, and camel’s hair. Hosiery and the making of carpets may also be classed as departments of the worsted branch of the woollen industry, though the best carpets (Turkey, Brussels, Axminster, &c.) are made on a ground of strong linen or hemp, and only inferior

kinds (such as Kidderminster, Scotch, &c.) entirely of wool. Artistic hand-made carpets are produced in Ireland, chiefly in Donegal, and still more valuable ones in Persia and other Eastern countries.

Besides woollen and worsted yarn another kind originally derived from wool is now employed in the woollen industry in the production of a coarse but cheap kind of woollen cloth. The raw material in this case is obtained by tearing up cast-off woollen clothing and woollen rags into fibres, which can be re-spun into a yarn, not very strong indeed, but capable of being woven. This material is known as shoddy when made from fragments of loose texture, and mungo when made from the remains of finer fragments, such as old dress-coats, tailors' clippings, and the like. This industry, besides using up all the available woollen rags of British production, has given rise in England to a large import trade in rags of this nature.

In the Middle Ages woollen manufactures attained their highest development in Flanders, which had the advantage of being within easy reach of abundant supplies of wool especially from England, and being able to send its manufactured products to the best markets by sea, river, and land. In the middle of the twelfth century Flemish woollens were already worn in France and Germany. A writer of the thirteenth century says that all the world was clothed in English wool wrought in Flanders. It was from Flanders that English kings at different times introduced artisans into England with the view of improving the woollen manufactures of their country. Towards the close of the eleventh century this was done by William the Conqueror; it was again done by Edward III. in the first half of the fourteenth century, and again by Henry VII. towards the close of the fifteenth.

England had already begun to export considerable quantities of woollen cloth in the sixteenth century, but the cloth was often, if not mostly, undressed and undyed, these finishing processes being performed in Holland as late as 1603, and for the finest fabrics down to the middle of that century. Early in the following century the woollen industry of England had risen to such importance that woollen manufactures formed upwards of 40 per cent. of the value of the exports, and about 1780 this industry is spoken of as having 'long been the glory of England and the envy of other nations.' Soon after that it began to share in the improvements brought about by the introduction of machinery into the cotton manufactures, but as the leading industrial countries of the world all form great markets for woollen goods, the British woollen industry (in the wide sense of the term) never acquired the predominance attained by the British cotton manufactures. In 1921 the factories engaged in woollen, worsted, and shoddy manufactures in the United Kingdom employed about 237,000 persons, considerably less than half the number

employed in the various branches of the cotton industry. Nearly half of these were employed in the woollen (including shoddy), the remainder in worsted factories. It is noteworthy, however, that native English wools are best adapted for the worsted industry, which helps to account for the fact that it is in this branch that England has long maintained a special reputation, as is well shown by the character of our export trade in wool products.

British Exports in millions of lbs.

Average of years.	Woollen yarn.	Worsted yarn.	Alpaca and mohair yarn.
1862–66 . . .	1·5	27·8	1·5
1901–05 . . .	1·8	51·2	19·0
1906–10 . . .	2·7	55·4	16·3
1926–30 . . .	6·6	37·8	7·6
1931–35 . . .	7·1	33·0	4·1

The export of combed wool made up into bundles known as tops increased from 6·4 million lbs. in 1890 to an average in 1926–32 of 34·4.

British Exports in millions of square yards of woollens and worsteds, exclusive of blankets, carpets, flannels, and druggets.

Average of years.	Woollen tissues.	Worsted tissues.
1857–61	25	134
1896–1900 . . .	52	113
1901–05	56	103
1906–10	83	91
1911–13	101	71
1921–25	129	63
1926–30	122	43
1931–35	62	32

In certain parts of the European mainland it is now customary to have woollen yarns, as well as wool and woollen fabrics, 'conditioned'—that is, tested as to weight, measurement, and condition in recognised establishments for the purpose. The submission to this test is voluntary, but so general is the practice that at Roubaix, where there is one of the largest of these establishments, nearly all the yarn used in local factories is conditioned. A similar establishment was opened at Bradford, Yorkshire, in 1891, and is provided with ingenious testing apparatus partly due to local invention. It serves primarily to protect the buyer against an undue amount of moisture in the wool purchased.

SILK. Next to wool, silk is the most important of animal products used in weaving. The great bulk of the silk of commerce is derived from an animal called the **silkworm**, but which in reality is the caterpillar stage of a kind of moth, whose favourite and best food consists of the leaves of the white mulberry (*Morus alba*, L.). It is hence called *Bombyx mori*, or the mulberry bombyx. In the body of the silkworm the substance that becomes the silk fibre exists in the form of two jelly-like masses, which harden on exposure to the air.

When the 'worm' is about to pass into the chrysalis stage, it sends out this substance by two minute openings at the head, and the two streams, at once uniting, form an extremely fine thread, which the worm coils round itself, so as to form what is called a cocoon. From the cocoons the silk of commerce is directly obtained, but the thread of a single cocoon is much too fine for use in spinning and weaving, and hence in reeling off the fibre the threads from several cocoons are united, individual threads being sufficiently adhesive to make this an easy matter. For the finest qualities of silk fibre, the product of from five to seven cocoons is used; for coarser qualities, the product of eleven or twelve, or even twenty or more.

After being reeled off from the cocoons the silk is made up into hanks, and in this condition forms the raw silk of commerce. The outer husks of the cocoon and a part of the silk in the interior are incapable of being reeled off, and in addition to that, numerous fragments of thread remain as refuse after the process of reeling. These are exported from silk-producing countries under the names of husks, knubs, and waste, and such material is now largely employed in the manufacture of silk fabrics, especially in the United Kingdom. Cocoons also are exported, but generally in comparatively small quantity; for since 100 lbs. of cocoons yield only about 9 lbs. of raw silk, it is obvious that the carriage of the silk in the latter form must be much more economical than in the form of cocoons.

Since mulberry-leaves form the principal food of the silkworm, the animal can be reared in all climates in which the mulberry thrives. Silkworms are usually reared under cover, the trees being stripped of their leaves in order to supply them with food, and the animals can thus be protected from cold and other influences of the weather that might be injurious to them. The range of climate suitable for silkworm rearing is consequently a wide one. Still, the character of the climate is very important. The health and productiveness of the caterpillars are greatly affected by the temperature, and as the rearing of the insect from the egg to the formation of the cocoon is completed within seven weeks in spring, there are great fluctuations in the amount of raw silk produced, according as the weather is genial or not. In China the rearing of the 'worms' begins about the beginning of April, and the yield of silk is apt to be greatly diminished if during that month the temperature sinks much below 60° F. In Japan the 'autumn crop' free from the vagaries of spring is now as important as the spring crop. But the geographical distribution of raw silk production does not depend solely on climate. This industry is almost confined to the Old World, and indeed to Asia and Europe, notwithstanding that there are many regions elsewhere in which the climate is all that could be desired for the purpose. This limitation in the range of production

arises from the nature of the labour connected with the industry. The tending of the silkworms previous to the spinning of the cocoons, and the subsequent operations necessary to prepare the raw silk for the market, demand not only a considerable amount of labour, but likewise the utmost carefulness and delicacy on the part of those employed. Silkworm-rearing is therefore generally confined to those parts of the world in which the labourers are not only content with low wages, but have inherited from previous generations a capacity for watchfulness and delicate manipulation, and have been trained in these habits from a very early age. Thus the United States, though the largest manufacturer of silk goods in the world, is entirely dependent on imported raw silk.

In all probability it was in **China** that attention was first given to the rearing of silkworms, and that silk manufacturing was first carried on, and it is that country in which the production of silk is still most extensive. Chinese history or legend ascribes to Si-ling-she, who is said to have lived about 2700 B.C., the honour of having discovered the art of spinning and weaving silk; for which discovery she has been canonised, and is still in China worshipped as a saint. The rearing of the silkworm is generally distributed over China, but is principally carried on in the middle provinces (about latitude 30° to 35° N.), and in the southern province of Kwang-tung. In addition to the produce of the carefully reared and tended mulberry moth, there is a large amount of silk obtained in China (in all about one-fourth of the whole product) from various other moths, and from the mulberry moth in a state of nature. About one-tenth of the total export of silk from China is classed under the head of **wild and coarse silk.**

Next to China, the country which produces the largest amount of silk, both for home consumption and for export, is **Japan**, the export of which country has, for many years now, far exceeded that of China. The production of raw silk in Japan was subject to greater fluctuations than in China, a natural consequence of its more northerly latitude and greater liability to cold springs until the development of the autumn crop. The Japanese have readily adopted European inventions and the bulk of the silk is reeled not by hand but in steam filatures. The Chinese are following suit. In 1894 China exported 4,344 piculs of filature silk, against 79,000 piculs of hand-reeled silk; in 1911 the export of filature silk had risen to 55,400 piculs, against 40,700 piculs of hand-reeled; in 1924 filature silk 81,000 piculs, hand-reeled 28,000 piculs, in 1929 filature silk alone 152,000 piculs. (One picul = $133\frac{1}{3}$ lbs.)

In **India** the rearing of the mulberry silkworm appears to have been introduced as early as the sixth century of our era, but the industry is far from having attained the importance which it possesses in China and Japan. The mulberry is chiefly cultivated in

Bengal, where the East India Company made special efforts to foster the production of silk as far back as 1767. Soon Bengal silk became an important article of export, and the production of silk was further stimulated by the fact that the Company itself erected silk factories in the province. Since then the rearing of silkworms has been a stationary, if not a declining, industry in India, and the export of raw silk is only a third of the import. In India, also, considerable quantities of silk are obtained from other moths, one or two species of which are sometimes domesticated, though for the most part they are left to themselves. These ‘ wild ’ moths are principally found in Assam, the Central Provinces, and the more sparsely peopled region in the west of Bengal. The general name of tussore silk is given to their produce, and most of the silk so called is distinguished by its natural fawn colour. Wild silk, chiefly derived from various species of *Anaphe*, is also produced in different parts of Africa.

The export of silk from Indo-China is quite insignificant, though there, also, there must be a large local production. More important is the export of Persia, where the rearing of the silkworm, now principally carried on in the narrow strip between the Elburz Mountains and the Caspian, is said to have been introduced about the same time as it was into India. In an earlier period the Persian silk was widely celebrated, and was the foundation of an extensive trade with western Europe. Of other Asiatic seats of silkworm-rearing the principal are Transcaucasia, Asia Minor, and Syria.

Herodotus is the first European writer who is believed to have referred to silk, if, as Richthofen conjectures, the Median garments of I. 135, VI. 112, were of this material. In the early days of the Roman Empire silk had already come into use as a material for garments worn by the rich, and before the commencement of the Christian era the raw material had been imported into Italy, where it was woven into tissues. But it was not till the sixth century A.D. that Europe was able to make a beginning with the rearing of silkworms. Justinian, who was at that time emperor of the East, and his consort, Theodora, encouraged the new branch of agriculture, of which Greece, and more particularly the Peloponnesus, became the principal seat. The peninsula just named is said to have obtained its modern name of Morea from the Greek word for a mulberry-tree. Greece continued to be the principal seat of silkworm-rearing in Europe down to the twelfth century ; but meanwhile silkworms had also been introduced by the Arabs into Sicily and Spain, and during the Arab (Moorish) domination in southern Spain the production of silk was very extensively pursued. In all the places just mentioned the rearing of the silkworm has since sunk to a subordinate place compared with that which it has achieved in other parts of Europe. It still flourishes, indeed, in Murcia and Valencia in Spain, in various

parts of Greece, and in other parts of the Balkan Peninsula; but the total estimated production of all these regions does not amount to one-tenth of that of Italy, which now furnishes, on an average, three-fourths of the silk produced in Europe. And now in that country the great silk-producing region is not the island into which the silkworm was first introduced, but the great plains of the north, Lombardy, Piedmont, and Venetia, in many parts of which the long rows of mulberry-trees, stripped bare of their leaves in summer, are a speaking reminder of the nature of the industry pursued in the neighbourhood.

Next to the Italian production, that of France, chiefly carried on in the valley of the Rhone, is the largest in Europe. Between 1874 and 1875 the amount of the French production was, on an average, only about one-fourth of that of Italy, but twenty years previously to the earlier date the production of France exceeded the Italian, having been five- or six-fold its present amount. In 1856, however, the business of silkworm-rearing in France began to be adversely affected by the outbreak of a disease among the worms; and the ravages of this disease, which at a later date spread to Italy, Spain, Greece, and even the silk-countries of the Far East, were such as to bring down the silk-production in France in 1876 to less than a tenth of what it was in 1853. After 1876, however, matters improved, chiefly in consequence of an important service rendered to the industry by science. The distinguished French chemist Pasteur, being appointed by the French Government to inquire into the nature and origin of this disease, discovered that by examining the moths with the aid of the microscope it was possible to distinguish those which laid healthy eggs. Since then the microscope has been recognised as an indispensable instrument in the rearing of silkworms. Each moth is caused to lay its eggs on a separate piece of linen in a corner of which the moth is afterwards wrapped. If afterwards the moth is found to show signs of disease the eggs are destroyed. While France has been able thereby to check the ravages of the disease, other countries which received it later have had the means of checking its spread before the evil attained the dimensions that it did in France.

Just before the Great War the supply of raw silk in the markets of Europe and America was yielded by different countries in the following proportions :—China, upwards of 40; Japan, about 20; Italy, rather less than 20; the Turkish Empire, about 6; France, about 3; Austria-Hungary, the Caucasus, and Persia, each less than 2 per cent. The total production of silk in the world is probably about 90,000 tons; 20,000 from China and 30,000 from Japan. Four-fifths of all the silk exported comes from Japan, Italy, and China; the United States, France, Italy, and Switzerland are the chief importers.

SILK MANUFACTURES. The silk fibre as it is wound from the cocoon, being a continuous thread, does not require to go through the processes necessary in spinning wool, cotton, and other fibres. The making of true silk yarn is known as **throwing**, and consists merely in giving the fibre a slight twist, which enables it to combine better with other fibres. For stronger fabrics several fibres of raw silk are united, being twisted into a fine cord. The processes undergone by silk waste to convert it into yarn are essentially the same as those adopted in spinning the other fibres mentioned above. The yarn so made is distinguished as spun silk from the thrown silk made by the other process.

Of the specially named fabrics made from silk, the chief are satins and velvets, the former being tissues so woven that almost the only threads appearing on the outer or 'right' side of the tissue are weft threads, which present a uniform glossy surface; the latter, tissues in which the outer surface presents to view a short soft pile, made by passing the warp threads over fine wires, which are afterwards drawn out. The loops then remaining are either left as they are, in which case the tissue is called pile velvet, or cut to form cut velvet. This fabric is now imitated in cotton and mixed tissues.

Though Italy was one of the earliest seats of the silk manufacture in Europe, and though during the Middle Ages this branch of industry developed to a high pitch in Venice, Lucca, Genoa, Bologna, and other Italian towns; though, too, that country, as we have seen, stands far ahead of all others in Europe in the production of the raw material, in the manufacture of silk fabrics it ranks far behind France, and its silk is exported largely in the form of thrown silk. The higher branches of the silk industry are now, however, more important than at the end of last century.

In silk manufactures **France now surpasses all other countries in Europe**, including Italy and Germany. The centre of the industry in France is Lyons, and the history of the industry in Lyons and the regions round offers some very interesting illustrations of the influence of political events, of inventions, and of fashion on the prosperity of manufactures, and the commerce depending upon manufactures. The silk industry of Lyons began to flourish after the capture of Milan by Francis I. of France in 1515, that monarch having then induced several silk artisans of Milan to settle in Lyons. Encouraged by that monarch, and at a later date by Henry VI., and favoured by the extension of silkworm-rearing in the valley to which Lyons belongs, the industry rapidly rose to a position of great importance, and the first blow inflicted upon it was due to the persecution by later French kings of the Huguenots, or French Protestants—a persecution which drove many of the French silk-workers out of France, and sowed the seeds of the industry in many other parts of Europe, even in Russia. From this blow, however, it

revived, and about the beginning of the nineteenth century it received a great impetus from the invention in Lyons of the celebrated apparatus named, after its inventor, the Jacquard loom for the weaving of figured patterns.

Originally invented for use in the making of silks, in which tasteful patterns greatly enhanced the value of tissues worn only or chiefly by the rich, this apparatus has since been applied to looms constructed for the weaving of other fabrics (linen, &c.) ; but its principal application is still probably in the silk industry, to the development of which, especially in France, it has greatly contributed. When the sewing-machine came into general use, fashions of ladies' dresses became more elaborate and more changeable, so that there has been much less demand for the fine and costly but lasting tissues which used to be the glory of the French looms. Silks of an inferior and less durable quality, and mixed fabrics having the appearance of silk, were sought after ; and since the looms of Germany and Switzerland were more speedily adapted to meet the wants of this new taste, the French industry suffered greatly in the competition. Subsequently, however, the French manufacturers adapted themselves to the new requirements of the trade. The competition of the cheap Japanese silks has beat all producers and, since the War, the great competitor has been artificial silk. The rising standard of living throughout the world, however, is leading to increased use of real silk as well as of artificial silks.

The **German silk industry** is carried on more or less in all the manufacturing regions of the country ; but Krefeld is the town which has its name most completely identified with this branch of manufacture. In **Switzerland**, Zürich and Basel are the chief seats of the manufacture. At Lyons, Krefeld, and elsewhere, there are **conditioning** houses for silk, similar to those for wool already referred to above.

In the **United Kingdom** the silk manufacture is not so highly developed as the other branches of the textile industries, and in the silk industry proper—that is, the industry in which thrown silk as distinguished from yarns spun from silk waste is employed, a great decline has taken place since the latter part of the nineteenth century. Of this decline there are several explanations. In the first place, the British Isles have not the advantage, like the chief silk-manufacturing countries of the Continent, of being able to produce any of the raw material as an article of commerce. Moreover, since the opening of the Suez Canal it has become less of a market for Eastern silk. The industry has thus developed with more vigour in some of the regions in which the supplies of the raw material were more ready to hand ; and when the duty on silks in this country was abolished, under the treaty with France in 1860, the British manufacturers found themselves completely beaten,

even in the home market, by those of France. In post-War years, however, the silk industry, hand in hand with artificial silk, has made great strides.

The spinning of silk waste and the weaving of ' spun ' or schappe silk grew in England, while the silk industry proper languished. They are carried on chiefly in the seats of the great textile industries of the country (Yorkshire and Lancashire), not in the counties in which the original branch of the industry has long been pursued (Cheshire, North Staffordshire, and Warwickshire, besides London).

Under the protection of a high duty, the silk manufacture has advanced with rapid strides in the United States, which now surpasses France in this industry. The chief seat of the manufacture is Paterson, in New Jersey, within fifteen miles of New York. The great Japanese industry is associated especially with the heart of the country, with production and spinning in the numerous small basins, weaving especially important at Kanazawa, and with Kobe and Yokohama as the great commercial centres and ports. As to artificial silks see p. 231.

COMMODITIES (*continued*)

B. Sub-tropical Products.

COTTON. Cotton consists of the tufts of woolly fibres which envelope the seeds of a shrubby plant. When the seed-vessel has opened, the tuft swells out to the size of an apple, and remains for a time firmly held by some of the withered parts of the plant, which partly close in upon it, but remain open enough for the cotton to be easily picked. The seeds are of about the size of small peas slightly flattened. Of all the products of a sub-tropical climate cotton is commercially the most important, and its importance dates back to the earliest times of which there is any record. The first mention of it is found in Indian books written more than eight hundred years before the Christian era. The first European writer who is known to have mentioned it is Herodotus, who wrote in the fifth century B.C., and speaks of a tree which he knew by repute as growing in India, and bearing instead of fruit a wool like that of sheep.[1]

The wide diffusion of the plant in pre-historic times is even more remarkable. While most of the chief cereals, along with flax and hemp, were introduced from the Old World into the New, and the New World gave to the Old maize, tobacco, and the potato, cotton was found by the earliest explorers, from Columbus to Cook, growing almost everywhere in the area in which it is now found.

At the present day its cultivation is almost universal in tropical and sub-tropical regions, but it is in the latter that it attains its widest extent. The United States, India, Egypt, Peru, and Brazil are now the most important places of production for this commodity so far as international commerce is concerned, and China is a very large producer of cotton for home consumption. In all these countries except India and Brazil, the districts where cotton is chiefly grown lie outside of the tropics, and in India, the cotton districts, though mainly tropical, are generally at least one thousand, and in some places two thousand feet or more, above sea-level. Its northern limit in the New World is nearer 37° N., but in the Old World it is largely grown in Russian Turkestan to the north of 40°

[1] One cotton-plant, probably *Gossypium arboreum*, was certainly known at a very remote date in Egypt. See Parlatore, *Le specie dei cotoni*, p. 16.

and even, in Chinese Turkestan, in the oasis of Turfan between 42° and 43° N., but this is at a level below that of the sea.

The cotton-plant is not, however, everywhere precisely the same. The genus *Gossypium*, to which all the cotton-plants properly so called are referred by botanists, is a genus containing several species which differ in size, in the colour of their flowers, and, what is most important from a commercial point of view, in the length, strength, and fineness of the fibre forming the tufts.

All the cultivated varieties are, however, now believed to be reducible to three species—*G. herbaceum*, Linn., and *G. arboreum*, Linn., both believed to be natives of the Old World, and *G. barbadense*, Linn., believed to be a native of the New World. The species now most widely cultivated, both in the Old World and the New, is *G. herbaceum*, for the *G. hirsutum*, Linn., the species to which the ordinary American 'uplands' cotton used to be referred, is now regarded as a mere variety of that species. It grows to the height of about four or five feet, and produces a soft and silky wool composed of fibres of moderate length, that is, from nine-tenths of an inch to an inch and a third long. It is a native of India, Indo-China, and the Eastern Archipelago, and has been introduced into all other parts of the world with a suitable climate—into the United States some time in the latter part of the eighteenth century. There it succeeds better than in its original home, yielding on an average a fibre of about one inch in length, as against one of about nine-tenths of an inch in India, and whereas cotton grown from Indian seed improves in the United States, that grown from American seed degenerates in India. It is the product of this species, as cultivated in the United States, that is generally known in the European markets simply as American cotton. The best of all cotton, however, is that derived from *G. barbadense*, and known as **Sea Island cotton**, from the fact that in the United States it was first cultivated on the string of flat islands which line the coast of Georgia and South Carolina. It is that which produces the cotton with the finest quality of 'staple' as it is called—in other words, that which has the longest, finest, and strongest fibres, and which in the mass has the most beautiful appearance. The length of the staple in this species may be as much as two and a half inches, though the mean length is said to be only 1·6 inches. If allowed to grow on from year to year this species of cotton may attain the height of from fifteen to twenty feet; but being, like other species of cotton, cultivated mostly as an annual, it is seldom allowed to grow to a greater height than two or three feet. The colour of its flowers is yellow. This species appears to thrive best on a slightly saline soil and where there are saline ingredients in the atmosphere, and to require a greater amount of moisture and a longer period in which to mature than the ordinary species. It is still cultivated on

the islands from which it takes its name, as well as in the northern parts of Florida, and has been successfully introduced into Egypt, Tahiti, the Fiji Islands, and some maritime districts of Queensland. A tree cotton known as **caravonica cotton,** said to be a hybrid between Sea Island and rough Peruvian cotton, has been grown for a considerable number of years in tropical Queensland, and has been introduced into other parts of the tropics. Its fibre is of long staple, strong and moderately rough, and as the plant has to be resown only every eight or nine years, its cultivation is recommended by the small amount of labour involved.

As regards climate, all the species of cotton-plant require for their successful cultivation a long summer free from frost, and with a moderate but not excessive amount of moisture. The cotton-plant is generally reckoned among those which prefer a dry warm soil, but it will put up with considerable differences in soil under diverse climatic conditions. To frost it is peculiarly sensitive ; and as it generally requires about seven months or 200 frostless days to yield a paying crop, this fact alone has a great influence on the extent of its domain. Very equable warm but not excessive temperatures, especially during the period of most vigorous growth, appear to be those most favourable to the plant, and plenty of bright sunshine seems to be absolutely essential to the production of fibre of good quality.

In the **United States,** which grows from one-half to two-thirds of the world's cotton, the cotton-plant is for the most part confined to the south-east. At the date of the census report of 1880 there was little cotton grown to the west of 99° W., and little to the north of 37° N. This is still true, but great changes have taken place within this area. Before the war of 1861–65 South Carolina produced about one-half the total cotton crop of the United States, and Georgia about one-fourth. In 1880 Texas was already among the leading states, and that state has sometimes produced about one-third of the whole crop. In 1892 the cotton-boll weevil entered Texas from Mexico and spread eastwards and northwards until it had ravaged the greater part of the cotton belt. Hence there have been great changes in the areas of maximum yield. The cotton belt is that in which summer rains prevail ; but the areas of greatest production are at a considerable distance from the sea-coast, the rainfall in the maritime strips, including Florida, being generally excessive for this crop, except for soils of the lightest character. The mean temperature during the months in which the plant is most rapidly growing and maturing its produce—June, July, and August—is remarkably uniform throughout this region, that of June varying in different parts from 74° to 81° F., July 75° to 84° F., and August 75° to 84° F. Cloudless days occur during June and July in the ratio of about 1 in 4 in the more maritime and easterly parts of this

region, in the ratio of 1 in 3 in the more inland and westerly, and in later months more frequently. The total area of the ' cotton belt ' of the United States is estimated at 700,000 square miles. Between 1879 and 1898 the area actually under cotton nearly doubled, rising from less than 20,000 to 39,000 square miles. In 1911–12 it was 56,300 square miles ; in 1914 it was 57,550 square miles, and the yield 8,067 million lbs. ; in 1918 the area under the crop was 56,078 square miles, and the yield 5,850 million lbs., which was the maximum of the four years 1915–18 ; in 1920 the area rose to 57,880 square miles, but in 1921 sank to 43,540. Then followed a remarkable expansion reaching 72,600 square miles in 1926 and the yield over 9,000 million lbs. In 1933–35 the acreage dropped below 30,000,000 (43,000 square miles in 1935). The belts of greatest relative production are the Mississippi ' bottoms,' or strips liable to occasional inundations on the left bank of the Mississippi from Memphis to Vicksburg, and the ' black belt of Alabama,' which runs from east to west across that state, somewhat to the north of its middle line. In this belt the use of manure for cotton was considered, till the latter years of the nineteenth century, quite unnecessary, and yet the yield was at least twice as great as the average of the United States generally. That average varies in different years from about 170 to 225 lbs. per acre. There is a similar ' black prairie ' region in the heart of Texas.

On the uplands and the Mississippi ' bottoms,' where cotton is chiefly grown, the soil is generally rich in lime ; and it is found that the extent of this branch of cultivation and the productiveness of the plant tend to increase, other things being equal, in proportion to the abundance of this constituent of the soil.

Throughout the United States cotton is, or was, generally planted in rows, the individual plants fairly wide apart to allow of cleaning the crop. In slave times this was done by means of the hoe, but now mule cultivators have come into universal use. In all the moister parts at least, the earth is ridged up at both sides about the roots to facilitate the escape of any excess of moisture. In latter years, however, the practice of thick sowing has been introduced, with the result of an increase of 30 per cent. in the yield. To a rather dry climate the cotton-plant has a certain power of adapting itself, yet an unusually dry season always involves a short crop, as an unduly wet one leads to a crop large in amount but deficient in quality. Among other things that have to be attended to in careful cotton-cultivation is, as in all other cases, the selection of the seed ; and, second, the treatment of the plant in such a manner that the fruit, and consequently the cotton-lint, is produced in greatest abundance. Hence the bush is not allowed to grow too luxuriantly, but is prevented from producing too much leafage and stalk by pruning, and where necessary by topping, that is, removing an inch

or two from the end of the stem. The time of sowing in the United States is the end of March or some time in April; the time of picking, from August to the end of the year, or, in the absence of frost, even later. Picking is done by hand, and is the most expensive operation in cotton-production. It is light work, however, in which women and children can be employed. One picker will pick on the average 100 lbs. of seed-cotton per day.

The use of manures in cotton-growing in the United States began in the older cotton States, above all in Georgia and the Carolinas after the civil war of 1861–65, and has been gradually spreading ever since. Investigation has shown that the plant is one of those which in ordinary circumstances rewards the outlay on fertilisers most generously, and that it is chiefly ignorance and custom that prevent an even wider adoption of a more advanced system of agriculture. And in connection with this subject there is one fact of the highest importance to remember, namely, that the commodity of greatest commercial value furnished by the cotton-plant is one that takes away from the soil comparatively little of its fertilising ingredients; so that if everything else were regularly returned to the soil, cotton, instead of being one of the most exhausting of crops, would be one of the least exhausting. It is the seed that withdraws from the soil most of the important constituents, potash and phosphoric acid; so much so that the removal of one crop of cotton-seed impoverishes the soil to the same extent as the removal of ten crops of cotton-wool. Now it is an important fact that, though the oil derived from cotton-seed is an article of great commercial value, the cake that remains after the expression of the oil contains most of the fertilising constituents of the seeds; and it would appear that cotton-oil-cake is one of the cheapest fertilisers which could be obtained in America. The cake may be used as manure either directly or by giving it as food to animals kept in cotton-fields.

In India the mode of cultivating cotton presents some curious and interesting contrasts to that practised in America. The period of the year during which it is grown is the same, since it is dependent on the rains of the south-west monsoon. But in the region of India where cotton is principally grown on a large scale, a region lying mainly on the peninsular plateau behind the Western Ghats, which drain the rain-clouds of most of their moisture, the total rainfall is often in some parts rather scanty. Beyond this region cotton is grown, in extra-tropical India, chiefly in the United Provinces and the Punjab, where the rainfall is even scantier, but where there are extensive areas under irrigation. As regards temperature, the chief cotton-growing region of India differs from that of the United States in having the higher temperatures in early summer and apparently in having a smaller proportion of bright weather. In furnishing the

following data for comparison, Akola may be taken as typical of Berar and Belgaum of southern Bombay :—

		May.	June.	July.	August.
Akola, 930 ft.	Mean temp. F.	93°	86°	80°	79°
	Percentage of cloud	19	62	85	80
Belgaum, 2,550 ft.	Mean temp. F.	80°	74°	71°	70°
	Percentage of cloud	34	77	88	85

On the table-land of India the scantiness of the rainfall is made up for by the peculiar character of the soil, which, from its colour and from its being so admirably adapted for the growth of native cotton, is generally known as the black cotton-soil. It is derived from the decomposition of the basaltic rocks which cover so large a portion of the peninsular area of India. It is of great fertility, and is said to have borne crops for thousands of years without manure. In one respect this soil agrees with the best soils of the American cotton region, namely, in the presence of lime. But the characteristic which renders it of such peculiar value in a region with so dry a climate is its remarkable tenacity of moisture. Instead of allowing the rain to sink away like the best cotton-soils of America, it becomes during the rains a tenacious mud. In dry weather the whole surface of the ground where this soil occurs becomes seamed with inter-ramifying cracks, between which the soil forms hard lumps, which still, however, retain water imprisoned in their spongy cells. Hence, wherever this soil prevails irrigation is not required for cotton-culture.

The yield per acre of cotton in India is generally much less than in the United States, being for the most part under 100 lbs. per acre. For this difference there are, no doubt, more reasons than one. Generally, though not uniformly, the better cottons have a prolonged period of growth. In those parts of India in which cotton cultivation is dependent on the summer rains, cotton cannot be sown till after the beginning of June, and growth is stopped by winter frosts in the north and on the black soils of the northern part of the table-land by the tearing of the roots through the cracking of the soil in the latter part of October. In southern Gujarat, east of the Gulf of Cambay, where some of the best native Indian cotton is grown, the picking does not begin till February. In southern Bombay, round Dharwar, sowing does not begin till August, and the picking goes on in March and April. In India manure is less used than in the United States. The staple of Indian cotton is generally short, from $\frac{1}{2}$ to $\frac{7}{8}$ of an inch, as against one inch or more for the ordinary American cottons, and this renders it unsuited for many of the branches of the manufacture carried on in Lancashire. Picking is done by women who pick about 45 lbs. per day.

During the present century, while the quality of Indian cotton generally has been greatly improved, there has been considerable

extension of the area under cotton, especially through irrigation in northern India as well as in the Central Provinces, and there has been an increase in cotton of good quality in the extreme south of the peninsula. About 1906 a variety of cotton known as Cambodia cotton was introduced from Indo-China and has proved well suited to the red soils east of the Cardamom Hills, when irrigated and heavily manured. The cotton having a staple of one inch in length, is capable of being used as a substitute for American cotton, and this fact, together with its high yield of 200 lbs. per acre, has caused its cultivation to be eagerly taken up there. Large quantities of the long staple American cottons are now grown in the irrigated lands of Northern India (Punjab and United Provinces), though the best types of American cotton deteriorate when grown in India.

In Egypt the cultivation is necessarily confined to the areas of perennial irrigation. The rich soil gives a higher average return than even the United States, the yield being over 300 lbs. per acre. The staple is from 1·2 to 1·5 inches, and the cotton is the best grown on a large scale, fetching 50 per cent. more than the average of American cotton and twice that of Indian. In recent years much of the production has been of the sakel or sakellaridis type with a staple of $1\frac{1}{4}$ to $1\frac{3}{4}$ inches. This high quality is no doubt to be ascribed partly to the fertility of the soil, and partly to climatic conditions. The skies are mostly bright, and the temperature rises and falls during the period of growth with remarkable regularity, as is shown by the following figures showing the mean temperature at Cairo from March to October :—

	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.
Temp. F. . .	62°	71°	79°	84°	85°	84°	79°	74°

Egyptian cotton is sown in March or April, and the first picking, which is the best, takes place in September. The picking is done by boys and girls, who pick about 30 lbs. a day. The combinations of conditions met with in the Egyptian delta seems not to be found elsewhere. Egyptian cotton has been tried in Sind, where the climate is sufficiently bright and dry, but the quality there grown is inferior, probably in consequence of the high temperatures of the earlier part of the season. The excessive heat of Upper Egypt has been found to be prejudicial to the strength of the fibre grown there. Egyptian cotton has also been tried in Texas, but though the temperature curves of some parts of Texas (as at San Antonio) are wonderfully close to that of Cairo, in those parts the climate is not equally bright and dry. On a small scale Egyptian cotton has been grown under irrigation with fair success at Phœnix, Arizona, and in a few other parts of the arid region in the south-west of the United States, but less than 1 per cent. of the crop is of this type.

At the present day these three countries, the United States,

India, and Egypt, furnish to the United Kingdom very nearly nine-tenths of its total supply of raw cotton, although about a century ago the supply from each of these sources was either nothing at all or relatively insignificant. During the period of 1786–90 the British West Indies furnished more than 70 per cent., the Mediterranean countries 20 per cent., Brazil about 8 per cent. of the total British supply; while the share of the United States and India together was under 1 per cent., and Egypt contributed nothing at all to the import from the Mediterranean. In the period 1886–88, on the other hand, when the total import had swollen from about 25,000,000 lbs. to about 1,750,000,000 lbs., the share of the United States had risen to 75 per cent., that of India to 12 per cent., and that of Egypt to $9\frac{1}{2}$ per cent., while the share of Brazil had sunk to $2\frac{3}{4}$ per cent., and that of the British West Indies to insignificance. In recent years the United States has supplied about 50 per cent., Egypt between 15 and 20; India 5 to 10; Peru rather less and Brazil between 1 and 5 per cent. Brazil is thus the only country which still retains any importance as a cotton producer among those which had most importance a hundred and fifty years ago. Special efforts have been made to encourage cotton cultivation in various parts of the British Empire, more particularly in tropical Africa, the British West Indies, and the Anglo-Egyptian Sudan. The urgency of this has long been felt, but was intensified after the outbreak of the War. The British Empire and Egypt produced about one-third of the world's cotton, but the British Empire excluding India only between 1 and 2 per cent. Large quantities of raw cotton are grown in Russian Central Asia, but this is solely for Russian consumption.

Now it is to be noted that it is to commerce alone that we owe the extraordinary development of the cotton production in the United States and Egypt, and the great extension of this branch of cultivation in India. Of the cotton grown in Egypt almost the whole is exported to Europe. Indian cotton is also exported, although a large proportion is now used in home mills, and even yet Georgia and North and South Carolina are the only states of the Union which consume a large proportion of the cotton they grow—the manufacturing areas being mainly in the north-eastern States.

The form in which the cotton is exported is that of bales, or large bundles of cleaned cotton, that is, cotton-wool freed from its seed by a process called ginning; and it is an interesting fact, illustrative of the variety of circumstances that affect the development of commerce, that the early extension of cotton-production in the United States was due to the invention of an improved process for effecting this purpose. Previously the process of getting rid of the seed was a laborious one, and hence one that demanded on economical grounds the cheapest available labour; and in 1792 so little was it thought probable that the United States would ever grow any

considerable quantity of cotton, that, in negotiating a treaty with Great Britain in that year, the United States ambassador agreed to a provision (struck out, however, by the senate) which forbade the export of cotton from the United States to this country. In 1793 the invention of the saw-gin by Eli Whitney (an invention since then greatly improved upon) imparted such a stimulus to the cultivation of cotton in the United States that that country rapidly became the chief source of supply of raw cotton in the world. The growth of cotton in India and Egypt received a great impetus from the scarcity of the raw material due to the civil war in America in 1861–65, and the effects of that impetus were permanent in both countries.

Inventions by which the process of manufacturing cotton were cheapened have likewise been, as is well known, among the chief causes that contributed to the vast development of the commerce in this commodity in various forms; and it is a fact of great consequence in the history of British commerce that all the more important of these inventions originated in England.

COTTON MANUFACTURES. The early history of the cotton manufacture in Europe is far from being fully known. The Arabs are said to have introduced the cultivation of the plant into Spain in the eighth century. It is an ascertained fact that in the middle of the following century cotton manufactures on a considerable scale were carried on in the Moorish towns of Cordoba, Granada, and Seville. It is no doubt to this fact that cotton owes its name, which is of Arabic origin. Augsburg is known to have exported cotton fabrics of its own manufacture in the fourteenth century. The first recorded importation of cotton into England was in 1298, for the making of candle-wicks (a manufacture, it must be remembered, of much greater relative importance in days when candles were the chief means of artificial lighting than now). In 1352 we find the first mention of Manchester cottons, but the fabrics so called were not what we know as cottons. Even as late as the seventeenth century a coarse kind of woollen cloth, a web of frieze, was known as cotton (Manchester, Kendal, and Welsh cottons of this kind are all mentioned), and the *New English Dictionary* expresses a doubt as to whether the term in this sense is of the same origin as the word in its present meaning. Later the term appears to have been applied to mixtures of wool and cotton or linen and cotton. That true cotton was used in Lancashire about 1640 appears from the fact that about that date there is mention of Manchester cotton buyers in the Levant. Pure cottons the English weavers were unable to make till long after. The use of cotton in manufactures extended very slowly. Between 1697 and 1749 the import of the raw material into England remained almost stationary, and there can be no doubt that about the latter date, and for some years after, the

manufacture of cotton goods on the continent was greater than in England. A change in this respect was brought about by the inventions that took place in England towards the end of the eighteenth century, and revolutionised first the cotton industry, and ultimately textile industries of all kinds.

Without entering into details, it is impossible to give an idea of the nature of these inventions, but a few dates are worth noting. In the first place, it may be mentioned that the most ancient method of spinning was by means of a distaff and spindle, the former an implement for holding the fibre to be spun, the latter for receiving the spun, that is, the more or less twisted fibre that forms the yarn. This arrangement was superseded by the spinning-wheel, the origin of which is uncertain. Not improbably it was used in the East long before it was known in Europe, but several forms of it appear to have been invented on the European mainland in the sixteenth century. Before the great era of inventions this machine had become common to the whole continent. The spinning jenny of Hargreaves, invented in 1764, patented in 1770, was the first machine by which more than two yarns could be spun at once. The water-frame of Arkwright (so called because soon after its invention water was used as a motive power in driving it) was an improved device for the same purpose, patented in 1769. In its improved form it is known as the throstle. The mule of Crompton, a sort of cross between the jenny and the throstle, constructed in 1779, was a much better contrivance than either, and is a machine still used for the spinning of weft yarns. These three machines changed in a great measure the condition of the cotton industry in Great Britain. The spinning-jenny was, indeed, an instrument that could be used in domestic spinning, and the chief effect of its invention was that the old spinning-wheel was thrown away into lumber-rooms, and the jenny adopted in its place, with the result of greatly increasing the output of yarn in each family. Arkwright's machine, however, was one more suitable for working in large factories; and factories began to multiply when, in 1785, it was declared that Arkwright had no claim to the patents which he had obtained, so that any one might adopt the inventions that had been patented in his name. The result was, that, whereas in the old days of the spinning-wheel the weaver might have to spend the morning going about to half a dozen cottages to obtain yarn enough to employ him for the rest of the day, there was now so much yarn produced that the supply greatly exceeded the demand. The hand-loom weavers were unable to use up the yarn that was produced.

The next step was the invention of the first power-loom by Mr. Cartwright, a clergyman having little knowledge of mechanics, and none of weaving. His first machine was patented in 1785, and an improved form in 1787; but even this second form had to be

improved upon by further inventions before it could be made capable of weaving cloth as rapidly and cheaply as a hand-loom.

Later a new spinning-machine known as the ring-spinning-frame was invented. It was first put in operation in the United States about 1832, but not until much later was it applied with success in the United Kingdom, where, however, it rapidly grew in favour for the production of warp. In all machines improvements in detail are almost uninterrupted, and all processes conducted by machinery were greatly accelerated by the introduction of steam-power to drive the machines. This was first applied in the cotton industry at Papplewick in 1785. In the case of spinning, the result of the change since the time of the early inventions is illustrated by the following facts. When the hand-wheel was still in use it required six or eight spinners to keep a weaver employed, and the earnings of a family amounted to only a few shillings a week. Even the mule was first employed as a domestic machine, and the earnings of a farmer in spinning were raised in some cases to as much as £6 per week. Before the close of the eighteenth century the cost in wages of the production of a pound of yarn of medium fineness was reduced to less than a halfpenny.

All these inventions were extensively applied in England a considerable time before they were introduced on the continent of Europe. In applying them England was peculiarly favoured by its abundance of coal and iron, and its admirable situation for commerce. Moreover, the wars which raged on the continent of Europe from about the time when these inventions began to take effect down to 1815 interfered with the development of industry on the continent much more than in Great Britain. The consequence was that England became pre-eminently the seat of the cotton industry, and even in 1801 manufactured more cotton than the entire continent of Europe. The value of cotton goods exported from Great Britain was officially estimated in 1785 at less than a million sterling; in 1815 it was estimated at upwards of twenty-two millions, and though, in accordance with what is mentioned on p. 18, it must be remembered that these estimates give no satisfactory indication of growth in value, they do indicate a very remarkable growth in quantity. After that the volume of the British cotton industry went on increasing with but slight fluctuations. The volume of the industry is best indicated by the quantity of raw cotton entered for consumption in the United Kingdom, and in all the quinquennial periods from 1831–35 to 1906–10 there were only two in which there was a decline as compared with the previous period, the only considerable decline being in the period of the American civil war 1861–65. The average quantity of raw cotton annually delivered to the mills of the United Kingdom in 1856–60 was 947 million lbs., in 1861–65 only 629 millions, in 1906–10, 1,835 millions. On the

average about four-fifths of the quantity of cotton manufactured in the United Kingdom were exported. The fact is that, so far as external trade is concerned, this country rapidly acquired and for long retained an unquestioned predominance in this industry, in spite of the fact that we are wholly dependent on imported raw material—a predominance that was never approached in the woollen industry, even when we had almost a monopoly of one of the most prized varieties of the raw material.

For this predominance are there any geographical reasons? In reply it may be stated that this predominance is due partly to the special natural advantages which we enjoy for the industry; partly to the general causes favouring concentration of an industry that is carried on on a very large scale; but still more perhaps to the fact that this is an industry that in a peculiar degree enables us to turn to account our great advantages for maritime trade. No class of goods has a wider market than cottons. They are consumed in all parts of the world. From any one centre of production most of the markets must be reached from the seaboard, and for such markets no country has on the whole advantages equal to our own. In turning these advantages to account in the cotton industry we were greatly assisted by our free-trade policy. In illustration of the widespread distribution of the British cotton markets, it may be mentioned that in the year 1913, when the total value of the cotton piece goods exported from this country was nearly £98,000,000, although India and China were by far the most important markets, there were, even when Hong Kong is reckoned with China, no fewer than eighteen countries or parts of the world (India, China, Turkey, the Dutch East Indies, Australia, Egypt, Argentina, British West Africa, Canada, the Straits Settlements, Germany, Brazil, Switzerland, the United States, the Netherlands, Southern Nigeria, the Union of South Africa, and Japan) which each took British cotton piece goods to the value of above £1,000,000, and nine (Chile, French West Africa, Colombia, New Zealand, Morocco, Belgium, Cuba, Siam, and Uruguay) which each took such goods to the value of between £500,000 and £1,000,000. The countries are mentioned in the order of importance as markets.

Notwithstanding the general growth in the volume of the British cotton industry there have been great changes in the destination of its products. In 1820 the continent of Europe received more than half the total quantity of cotton fabrics exported from Great Britain, the United States (which then had less than one-fifth of the population contained by them in 1880) received nearly one-tenth, and Eastern Asia little more than one-twentieth; in 1880 the continent of Europe received scarcely one-twelfth, the United States less than one-fiftieth, and Eastern Asia (chiefly British India) more than one-half of the whole. Of yarn Great Britain supplied large

quantities to the continent of Europe, but the proportion of the whole amount exported thither declined from above 95 per cent. in 1820 to 48 per cent. in 1891, though it afterwards rose, in 1901 to 52; in 1910, 67, and in 1913, 67 per cent. Eastern Asia, which in 1820 received no appreciable quantity of British yarn, received in 1891 33 per cent. of the amount exported, though the proportion afterwards declined (to 25 per cent. in 1901 and 16½ in 1913) largely as a result of Japanese competition.

Consumption of Cotton by World's Spindles for year ending January, 1931. (*From Int. Fed. of Master Cotton Spinners: Figures in thousands of bales.*)

Countries.	American.	East Indian	Egyptian.	Sundries.	Total.
EUROPE:					
Great Britain	1,087	219	247	473	2,026
France	719	245	102	111	1,177
Germany	819	243	76	65	1,203
Russia	283 [1]	113 [1]	52 [1]	1,661 [1]	2,109
Italy	549	248	44	26	861
Others	1,183	497	121	247	2,040
Total, Europe	4,640	1,565	642	2,583	9,416
ASIA:					
India	30	2,308	26	131	2,495
Japan	945	1,582	35	132	2,694
China	326	542	5	1,511	2,384
Total, Asia	1,301	4,432	66	1,774	7,573
AMERICA:					
U.S.A.	5,031	52	96	46	5,225
Canada	187	—	9	—	196
Mexico	—	—	—	163	163
Brazil	—	—	—	356	356
Total, America	5,218	52	105	565	5,940
Others	59	66	16	101	242
Grand Total	11,218	6,115	829	5,009	23,171

[1] Year ending 31 July, 1930.

Such facts point to a more rapid growth of the industry in other countries, and, so far as Europe and the United States are concerned, it is very clearly indicated in the accompanying diagram, that an ever-increasing proportion of America's output of raw cotton is consumed at home. The diagram shows that foreign competition is not merely a matter of recent years. Although the decline of British supremacy was greatly hastened by the War, it had become inevitable. Foreign competitors were at first engaged in the easier

task of conquering the home market, and only later began to compete more keenly in neutral markets. On the opposite page is a table showing the consumption of cotton, including all parts of the world, that now work up cotton by machinery on a large scale. India, Japan, and China have all comparatively recently entered the field as competitors in the machine cotton industry. The table, however, does not distinguish between the older and the newer seats of the cotton industry in the United States; but the growth of cotton spinning in the southern states of the Union, as well as in India and Japan, is peculiarly instructive. In the southern states the number of cotton spindles increased from 1·2 to 4·8 millions

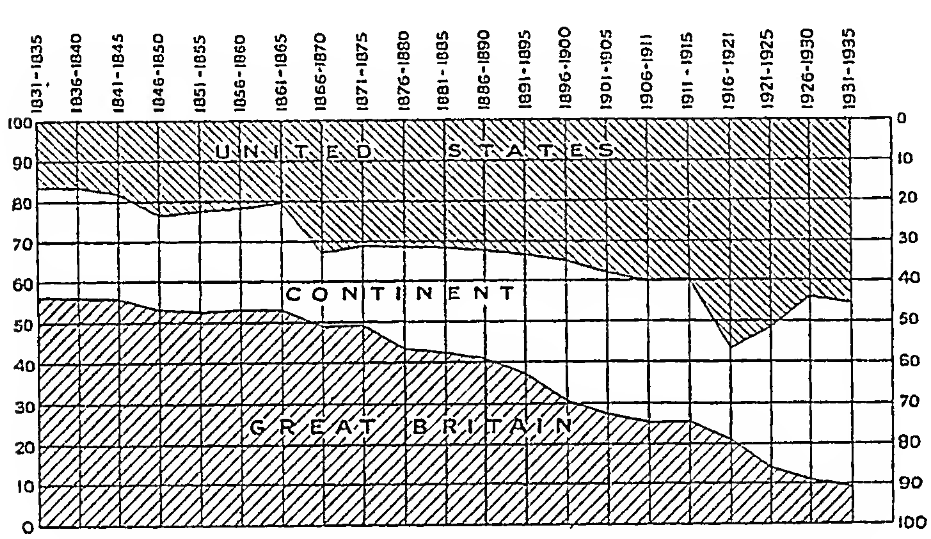


Diagram showing percentage of consumption of American cotton in Europe and the United States in quinquennial periods from 1831–35 to 1931–35. The interval between two adjacent horizontal lines represents a consumption in countries named of 10 per cent. of the total American supply.

between 1887 and 1900; in India from 2·9 to 4·9 millions between 1890 and 1901; in Japan from 325,000 in 1892 to about 1,000,000 in 1897. By 1930 there were 8·9 millions in India whilst Japan's total increased from 2·4 millions in 1914 to 7·0 millions in 1930 and, during the great world depression which decreased numbers elsewhere, to over 9·0 millions in 1933. In the case of the cotton industry of India and the United States the question of tariff hardly affects the matter. Till 1922 cotton yarns were admitted into India duty free, yet, in spite of dear coal, cotton spinning by machinery has continued to grow from its inception. The first mill was started in 1851. The geographical advantages of local supplies of raw material, abundant labour, and a local market have been decisive. Japan had a five per cent. duty on imported yarns, and has, besides

the local market, the advantage of local supplies of coal to counterbalance the necessity of importing the great bulk of its raw material. In the export trade it now competes with India not only in the Chinese but also in the Indian and other markets. A great hold was obtained during the War, later partly lost and then regained. In the United States the southern industry competes chiefly with that of the north, against which it enjoys no protection. Again the preponderating advantages are geographical. The growth of the industry, particularly in India and Japan, greatly affected the industry of Lancashire, which was compelled to turn its attention more and more exclusively to the higher (finer) counts of yarn, and the production of a greater proportion of woven goods for the Eastern markets—that is, goods in which the advantages of a more highly organised industry producing for a wider market can still tell. It was the increased production of finer yarns in the United Kingdom and the diminished production of the coarser yarns that accounted for the increase above indicated in the proportion of British yarns sent to the mainland of Europe, and for the fact that the number of cotton-spinning spindles in Great Britain remained so long much greater than in all the other countries of Europe put together. Thus, in March 1914 the United Kingdom had 56 millions (January 1931, 55 millions); on the mainland of Europe there were 44 millions (January 1931, 48 millions). A similar change has been brought about in the northern seats of the American industry by the development of the southern. But in neither case did the change stop there. Both India and the southern states of the Union began to manufacture the finer yarns in greater and greater quantity. In 1900–01 more than 20 per cent. of the weight of yarns produced in India was of counts above 20*s*. By 1918–19 under the stimulus of the scarcity of supplies from Lancashire during the War this had risen to 35 per cent. A steadily increasing quantity of woven goods has also been produced by mills in India. In the south-east of the United States of America and Japan, also, a steadily increasing proportion of spindles has been devoted to the higher counts. Notwithstanding all the changes, in 1935 Britain still had between 35 and 40 per cent. of the world's spindleage and between 55 and 65 per cent. of the 'mule spindles' necessary for the finer qualities.

In the spinning of raw cotton into yarn by the ordinary processes there is about one pound lost as waste in every six pounds of raw cotton, and there is further loss in the manufacture of cotton cloth. For some time this waste has been treated in large quantities on the continent of Europe in such a manner as to make it available for the spinning of either pure or mixed yarns, and this industry also has now been introduced into the United Kingdom. Cotton waste is also largely exported for wiping and polishing.

TOBACCO. The tobacco of commerce consists of or is obtained from the dried and otherwise prepared or 'cured' leaves of several species of a genus of plants known to botanists as *Nicotiana*, and now cultivated more or less in almost all parts of the world that have a warm enough summer. The use of tobacco in smoking and other ways is due to the presence in the leaf of a principle known as nicotine, which enables it to act as a stimulant and narcotic, but which, being an active poison, is capable of exercising most injurious effects if swallowed. Besides being used as a luxury, tobacco is used to a small extent in medicine, and more largely as a sheep-wash for the destruction of insects which infest the fleece. The species of tobacco most usually cultivated is the *N. tabacum*, Linn., which grows to the height of from four to six feet, and produces several clusters of white or beautiful pink flowers.

The tobacco plants are all natives of America, and the use of the leaf in smoking was widespread in that continent at the time of its discovery, in 1492. The practice was quickly adopted by the European discoverers, and by them was introduced into Europe, where, notwithstanding the prohibitions and denunciations of popes and crowned heads, it spread, at first slowly, afterwards more rapidly. In Europe the plant is said to have been first cultivated for its ordinary uses in Holland in 1615, but it soon extended to other countries. The increasing fondness of the people for the enjoyment of this luxury induced governments to encourage the cultivation for the sake of raising a revenue out of it. In Great Britain the cultivation of tobacco was forbidden at an early date for the sake of encouraging it in Virginia, where it became an important object of agriculture and article of commerce almost immediately after the foundation of the colony. In Ireland, the cultivation of the plant was allowed till the reign of William IV., when an Act was passed prohibiting it there also, for the sake of the convenience of raising the revenue; and both in England and Ireland the prohibition was continued till 1886, when the cultivation of the plant was again allowed under certain conditions.

Like maize, barley, and potatoes, tobacco is adapted to very diverse conditions. It can be grown anywhere in the tropics, and has been cultivated with success even in some of the counties of Scotland. The period within which it comes to maturity varies according to circumstances, and the limitation of its range arises principally from the necessity of protecting it during growth against frost. This is particularly necessary in the early stages, when a single white frost is enough to spoil the whole crop; and this is one reason that recommends the usual practice of sowing the seed in small beds, from which the tobacco is afterwards planted out in the fields, for in these seed-beds the seedlings can be sheltered from

frost by being covered with dried leaves or some other light material. Stagnant water about the roots is also quickly destructive to the plants.

Adaptable as tobacco is to a great variety of conditions, it exhibits in a peculiar degree the effect of this diversity in the differences of the characteristic qualities of the product. The tobacco obtained from a variety of the plant adapted to one soil and climate is widely different from that which is obtained from a variety adapted to a different soil and climate. These diversities are well illustrated within the wide area of the United States, in which Wyoming was the only region that had no tobacco cultivation down to the date of the census returns of 1880. The chief tobacco states of the Union are, however, North Carolina, Kentucky, Virginia, Tennessee, South Carolina, and Georgia especially, between about 36° and 38° N.

At the present day the total tobacco-production of the United States is by far the largest in the world with an output of over 1,000 million lbs., and that country furnishes nearly 80 per cent. of the tobacco imported into the United Kingdom. Next in quantity of production ranks British India ; but the quality of native-cured Indian tobacco is generally inferior. Cuba, Brazil, the Philippine Islands, and Asiatic Turkey are the other non-European countries of most importance for the quality or quantity of the tobacco which they produce. Cuba is, above all, noted for the quality of its cigars, which take the name of Havanas, from the place of export. The high reputation of the cigars bearing this name was originally due to the aromatic quality of the tobacco grown in the district known as the Vuelta Abajo (to the west of Havana). Spurious 'Havanas' are made in several countries but the Cuban Government with a view to safeguarding the reputation of the Havana cigar passed a law many years ago providing that every box or parcel of genuine Havanas should bear a guarantee label. Sumatra and British North Borneo vie with one another in producing the best cigar wrappers, a fact partly due to soil and climate, partly to care in treatment. The U.S.S.R. (Russia in Europe and Asia) is the third largest producer in the world.

In Europe, excluding Russia, the chief tobacco-growing countries are Hungary, Italy, Bulgaria, Germany, and Greece. Hungary also enjoys the reputation of producing the best quality. All these regions supply more or less of the British demand for this commodity. Under the regulations permitting the cultivation of tobacco at home, several crops were grown in 1886 in Kent and other English counties, and the experiment is said to have been a success so far as the quality of the tobacco is concerned ; but commercially the attempt to revive the cultivation of tobacco in England proved

a failure. In recent years renewed attempts have been made, as in Hampshire. All but a small percentage of the tobacco imported into the British Isles is unmanufactured, the duty on manufactured tobacco (including snuff) being considerably in excess of that on the unmanufactured article.

The trade in tobacco, in so far as it is not a state monopoly, as it is in several countries, is largely under the control of two great trusts.

Relatively to population, the highest consumption of tobacco is in Cuba where it is nearly 16 lbs. per head per annum. Next come Holland 9·5, Argentina 7·1, the United States, Belgium, Switzerland, Germany, and the United Kingdom. The average consumption in the United Kingdom (3·2 lbs. per head) is only a third of that in the Netherlands.[1]

OPIUM. Opium is the hardened juice of a cultivated species of poppy called *Papaver somniferum*, Linn., which is believed by some to be only a variety of the wild species *P. setigerum*, DC., a native of the shores of the Mediterranean. Whether this be so or not, there is reason to believe that the cultivated form has existed in India for a period not far short of three thousand years. The juice is contained in the seed-vessel, the wall of which is scratched so as to allow it to exude. It then hardens, and is picked off. Opium is chiefly used as a stimulant or narcotic, and is either swallowed in small quantities or smoked (by itself or in prepared mixtures), or taken in the form of certain preparations made from it. Of these the most important are laudanum, which is made by soaking opium in spirits of wine, and solutions of morphia, which is the narcotic principle of opium.

It was in India that opium was chiefly grown as an article of foreign commerce, and in British India its cultivation is a monopoly of the government, which once derived from this article in one way or another an annual revenue of about ten millions sterling. The two districts in which it was grown were the valley of the Ganges, round Patna and Benares, and a fertile table-land further west, corresponding to the old kingdom of Malwa. Towards the end of 1906 edicts were issued by the Government of China having for their object the suppression of the use and cultivation of opium in that country within ten years, and in 1911 the Government of India agreed to bring the export entirely to an end in 1917 or earlier, if proof was given of the absence of native-grown opium in China. There is now no ordinary trade in opium between India and China.

[1] These facts are taken from the Chambers of Commerce Atlas and are based on consumption in the years immediately following the War. Owing to the remarkable increase in smoking amongst women in England the position is probably now somewhat different. Certain countries, such as India, where tobacco is grown for local use, would probably rank very high on the list.

Official Chinese statistics show no import at all, except of small quantities for use in Japanese leased territories.

The acreage dropped from 615,000 in 1906–07 to 43,000 in 1930–31. Export is now from the Government of India to duly accredited foreign governments *only*. Cultivation is now virtually restricted to Ghazipur (U.P.).

Outside of China and India, opium is chiefly consumed in Mohammedan countries, where it has a fairly general use as a substitute for wine and spirituous liquors. Persia and Asia Minor are hence the principal countries of western Asia in which this drug is cultivated, and in both it forms an article of export. The export of Asia Minor now exceeds in quantity that of India, and in quality the product of this region surpasses that of any other part of the world. In the countries of western Europe opium is chiefly used in medicine, and the English supply is mainly derived from Asia Minor (Smyrna).

TEA is the name given to the dried leaves of one or more shrubs or trees allied to the camellia. The agreeable stimulant to which tea owes its value in commerce is, chemically, almost identical with that found in the two commodities next considered, coffee and cocoa. These three commodities likewise agree in requiring for their cultivation at least warm summers with frequent rains, although they differ greatly in the degree of cold they will stand. They also agree in requiring more or less cheap labour to prepare them for the market, and this necessity in many cases excludes them from regions where the climate is quite suitable. Lastly, they agree in being derived from trees which take a certain number of years to come into profitable bearing, and this circumstance would appear to have some effect on the fluctuations of prices of these commodities, and hence indirectly on their geographical distribution. The fluctuations in price are very striking in the case of coffee. No doubt several causes have contributed to these fluctuations, but it may be suspected that one cause is to be found in the long period of waiting for returns. High prices are likely to stimulate the laying out of coffee plantations in all parts of the world that meet the requirements of climate and labour. When these plantations come into bearing there is likely to be an over-supply, leading to a fall of prices that tends to throw out of cultivation the plantations in those parts of the world that are least favourably situated. Somewhat similar fluctuations are observable in the case of cacao prices. They are not so, however, in the price of tea, the price of which fell almost uninterruptedly from 1865 to 1904. But here we have to note another geographical effect. During the period of falling prices the area under tea has been steadily expanding in India, and latterly also in Ceylon, but the increasing production of these two parts of the world has evidently told severely on China, which has not

adopted modern methods of transport, and only quite recently and to a very limited extent has introduced modern machinery for preparing the leaf. The Chinese export of tea both by sea and land amounted in 1881 to about 300 million lbs. Before the end of the nineteenth century it had sunk to less than 215 million lbs. In 1929 China's export was 126 million lbs.; in 1935 it had fallen to 84 million lbs.

Considering the extensive consumption of tea, coffee, and cocoa one may well be struck at the comparatively small areas required for their production. The bulkiest and that requiring the greatest extent of ground is coffee, the total amount of which annually produced is not much more than 2,500,000 tons, which may be compared with the 5 to 6 million tons of wheat and flour annually imported into the United Kingdom. J. C. Willis in his *Agriculture in the Tropics* (Cambridge, 1914), p. 66, estimates the total acreage under coffee at about 5,000,000 acres or about 7,800 square miles, an area not much greater than that of Wales. For 1911 the acreage under cacao, producing in all about 240,000 tons, is estimated by the same authority (p. 69) at 1,800,000 acres or about 2,800 square miles, less than one-thirteenth more than the area of Lincolnshire. The production of cacao, between 400 and 500 thousands of tons, in the years following the Great War, was roughly double the pre-war production, and the world's total is now over 600,000 tons.

The tea-plant comes into full bearing in the fifth year. It generally grows to the height of from three to eight feet, but sometimes much higher. One variety, which grows wild in Assam, and is by some regarded as the stock from which all other tea-plants are derived, attains the dimensions of a tree. The name of the plant and its product is Chinese, which is due to the fact that it was in China that the plant was first cultivated, and that Europeans first became acquainted with it. Even in China the plant is said to have been unknown till the middle of the fourth century of the Christian era, and it did not come into general use in that country till four or five centuries later. The first European who is known to have mentioned it is the traveller Pinto, who visited Canton in 1544. As late as 1664, the English East India Company, when it wished to make a present of some tea to the King of England, had to buy a small quantity for the purpose from the Dutch, and when it was first imported into England, in the year following (1665), it was sold at the rate of £3 per lb.

Tea is one of the hardiest of all sub-tropical plants. Severe frosts, such as it is exposed to in northern China, check its growth and diminish its yield, but do not kill it. The plant is hence suited for a wide range of climate, but the climate best adapted for it is that which is warm, moist, and equable throughout the year. Like the cotton-plant the tea-shrub requires regular supplies of

moisture during the summer months, but is easily injured by an excess of moisture settling about its roots ; so that the ground on which it is grown ought to have good drainage. All these conditions are best obtained on the slopes of mountains within the tropics or in sub-tropical regions, and it is in such situations that tea is chiefly grown up to an elevation which varies with the latitude.

The soil best suited to the tea-plant is said to be virgin forest soil, a light, rich, friable loam containing a good supply of vegetable mould or humus, or of organic matter in some other form ; and such soils are also most readily obtained in the situation just described. The presence of iron either in the soil or subsoil is believed to be always desirable, and hence reddish soils are preferred to others which are equally suitable in other respects. It is noteworthy that, unlike cotton, tea is chiefly grown, in the principal countries of its production, on soils that are remarkably poor in lime.

But the successful cultivation of the tea-plant depends not merely upon soil and climate. In its preparation for the market tea demands much hand-treatment, so that it can be profitably grown as a marketable commodity only in those parts of the world which, besides having the other conditions suitable, have a plentiful supply of cheap labour. It is for this reason that China, India, Ceylon, the Dutch East Indies, and Japan are still the principal countries of its production.

In China the first crop of leaves is gathered from it at the end of the third year, but care is taken not to exhaust the plant by stripping it too closely. Thrice in the year the leaves are picked—in the third, fifth, and eighth month. The best leaves are the young ones, and as the youngest are first picked, the earliest gathering is the best. Women and children are mainly employed in this work. Having been first dried in the sun, the leaves are then trodden out by naked-footed labourers, in order to break the fibres and extract the moisture. This done, they are heaped up and allowed to heat for some hours, until they have become a reddish-brown colour. They are next rolled up by hand, and are afterwards again exposed to the sun should the weather be propitious ; but if not, they are slowly baked over charcoal fires. The object of the rolling is to mass the leaf in a state conducive to rapid fermentation, which is brought about by exposure of the leaf to a temperature of 104° F. for about an hour, and has the effect of reducing the proportion of tannin in the leaf from ten or twelve to about five per cent. The fermentation is finally stopped by drying in the sun or by baking over charcoal fires. With this process the preparation of the leaves in the form in which 'black tea' is mostly sent to the market is complete, and they pass from the hands of the growers to those of the native merchants. By these purchasers they are carefully sifted, the leaves of different sizes and ages are separated, and the stems and damaged

leaves are removed. In the preparation of 'green tea' there is no fermenting process, but the leaves are merely roasted in an iron pan while being stirred with a stick, and then rolled a little, these operations being repeated several times in succession and the tea finally dried off. Rolling machinery is very little used in China, but the severe competition brought about by the development of tea cultivation in India and Ceylon has, since about 1898, led to its introduction.

Tea is also prepared in China in the form of bricks and tablets for convenience of land transport by porters or pack-animals. The ordinary brick-tea is made only of the refuse of the tea prepared by ordinary methods—inferior tea-leaves, stalks, and tea-dust. But of late years the finest tea-dust has been compressed by steam machinery into tablets of tea of excellent quality, which are exported to Russia. A kind of tea known as 'flat tea' is prepared in Japan from unrolled leaves picked from bushes that have been partly blanched by being grown in the dark for two or three weeks before picking.

The introduction of tea-cultivation into India was due to government incentive. Experimental plantations were started by the Indian government on the hills of Assam, and at different points on the southern slopes of the Himalayas, between 1834 and 1849, and a grant of land was made by the government to the first private tea company formed in India, in 1839. It is only since 1851, however, that tea-planting in India has been a marked success.

The single province of Assam contains more than half the total area of Indian tea-plantations, but tea is also extensively grown at various points on the Himalayan slopes, in Bengal, the United Provinces, and even in the Punjab, and also on the Nilgiri Hills in southern India, and to a very small extent in Lower Burma. In northern India the limit in height of profitable cultivation is mostly about 3,500 feet above sea-level, but on the Nilgiris the best elevation is from 4,800 to about 5,600 feet.

There are three main varieties cultivated in India—the Chinese plant, which yields a comparatively weak tea, and furnishes a small yield; the native tea of Assam; and a cross between the two, which last is most in demand among the planters. The method of cultivating and preparing tea in India is much the same as in China, except that the bushes while bearing (that is, during the southern monsoon, March to November) are picked about once every ten days, and that the rolling is performed by machinery. The average yield of an acre under tea in India varies in different localities from about 100 to above 400 lbs. per acre, and statistical returns on this head betoken an improvement in the methods of cultivation. In 1882 the average for the whole of India was under 300 lbs. per acre, but in 1910 it was above 450 lbs. In 1928 and 1929 it was over 500 lbs. These figures, however, are for the whole area under tea,

inclusive of immature plants. In the principal tea-growing province, Assam, the average yield of the gardens containing mature plants was well over 500 lbs. per acre.

About 1880 the cultivation of tea in Ceylon began to extend with extraordinary rapidity in consequence of the failure of the coffee-plantations. The soil and climate have been found to be admirably suited to the shrub, which has yielded in some localities as much as 1,000 lbs. an acre ; and the cheap coolie labour, no longer required on the abandoned coffee-plantations, afforded the means of preparing the product for the market at the smallest possible cost. Leaf-rolling machinery here, also, is in general use. The rapid growth of tea-production in Ceylon is shown by the fact that the export increased uninterruptedly from 1·67 to 148·6 millions of lbs. in the last eighteen years of the nineteenth century. The year 1883 was the first in which the export exceeded one million lbs. In post-war years the production has averaged between 200 and 250 million lbs. of which rather over three-fifths goes to Britain.

The production of tea in the Dutch East Indies has made great strides. The first plantation was made in Java in 1827. In the last few years the output has been almost as great as that from Ceylon. Ninety per cent. of the total is grown on plantations managed by Europeans or Chinese, but the remainder is grown by the natives on their small holdings. The most important area is between 1,000 and 4,500 feet above sea-level (compare Ceylon) in western Java, but the output from Sumatra is increasing.

Into Japan and Korea the cultivation of the tea-plant is said to have been introduced early in the ninth century A.D., and the former country has now an export trade in this article which ranks in quality and value after that of India, Ceylon, and Java. Japan tea is mostly prepared as green leaf (the leaf being simply steamed, rolled and fire-dried). Almost the whole of this export is taken by the United States.

The cultivation of tea has likewise been tried with more or less success in the United States, Brazil, Trans-Caucasia, Jamaica, Natal, and Madagascar. The high price of labour in the United States generally makes tea unfit for cultivation as a marketable commodity, though it has been grown for home use on a small scale on many of the farms in the southern states, and in California. Tea of excellent quality has been grown among the German colonies of southern Brazil. Of recent years Nyasaland has become an important producer of tea, and the industry is considerable in Natal also.

Outside of Asia, people of English and Russian race are by far the greatest consumers of tea. Of the total amount exported from all countries in one year, the United Kingdom takes more than half, America (chiefly the United States and Canada) about one-sixth,

and Australia and New Zealand one-twelfth. The rate of consumption per head of population in the United Kingdom is about 9 lbs. a year ; and this proportion is even exceeded among the people of Australia and New Zealand. The Dutch, who were the first to introduce tea into Europe, still consume a considerable amount relatively to population, and so also do the Belgians ; but in other European countries outside of Russia the consumption is insignificant. The total exports of tea approximate to 900,000,000 or 1,000,000,000 lbs. annually.

COMMODITIES (*continued*)

C. Tropical Products.

COFFEE. The coffee of commerce consists of the seeds (the so-called '**beans**') of several species of trees or shrubs, chiefly of one species known to botanists as *Coffea arabica*, Linn., which if left to itself grows to the height of twenty-five or thirty feet, but in cultivation is frequently kept down to the height of from three to eight feet in order to facilitate the gathering of the fruit. The seeds are enclosed in dark cherry-red pulpy berries, each of which usually contains two. The tree comes into full bearing in six years, and remains profitable for from thirty to forty years, after which the soil is worn out. The **best soil** for the coffee-tree, as in the case of tea, is said to be virgin forest land rich in vegetable remains, the accumulations of past ages. A warm and moist climate is required for it, but the heat must not be excessive. An almost ideal climate for coffee is found in Yemen, the home of the original Mocha coffee. Here, winter and summer alike, a thick mist ascends every morning from the low grounds on the coast to the slopes on which the coffee is grown. About midday the plantations themselves become enveloped in mist, which lasts till after the time at which the greatest heat of the day is usually experienced elsewhere, and then disappears. So regular is this occurrence that in certain places there are scarcely twenty days in the year on which the mist fails to rise. By night, on the other hand, the air ascending from the hot plains helps to prevent an excessive lowering of the temperature, so that we have, as it were, a hothouse culture with natural self-regulating arrangements.

For the most part, coffee-trees, at least when young, must be cultivated either under cover or under the shelter of trees better fitted to stand extreme heat. Bananas and erythrinas are frequently grown for this purpose, and in Brazil a tall, coarse pea, which enriches the ground with valuable manure when it dies down, is often planted with the same view. On the other hand, the coffee-tree cannot stand continued frost; and though it has to endure occasional frost in Paraguay, in most coffee-growing countries the mean temperature of the coldest month is above 52° F., and the mean minimum temperature about 42½°. On this account, its range in

latitude is more contracted than that of tea. Coffee, indeed, is not grown to any great extent outside of the tropics, although the most important place of production, the coffee region of Brazil, lies just beside the outer limit of the tropical zone.

Even within the tropics, the cultivation of coffee is generally restricted to comparatively limited areas ; the reason of which is that coffee is a product grown almost solely as a mercantile commodity, that is, for consumption outside of the regions in which it is produced, and, at the same time, is one that demands a large amount of labour in preparing it for the market.

The preparation which the coffee-beans have to undergo before they are ready for the market consists in their separation from their coverings and the processes of drying and 'curing.' In making the finest kinds of coffee the berries are, first of all, **pulped,** or stripped of the outer pulpy covering, in a machine specially devised for the purpose. The **curing** process which then follows consists in exposing the beans to the sun for six or eight days ; and as the beans after being pulped are extremely sensitive to injury from rain or dew, great care must be taken during this stage to protect them from these influences. When cured the beans are, in most coffee districts, sent to coffee-works erected in the larger towns or the seaports to be **hulled** or **peeled**—that is, divested of two coats in which each of the beans after pulping is still wrapped. Before being put into bags for shipment the beans are winnowed, graded, and sorted, the sorting being not only according to quality but also according to size, since beans of the same size can be more equally roasted before being ground.

The use of coffee as a beverage appears to have been very limited till within the last two or three hundred years. The oldest work known to have collected traditions regarding the origin of the practice is an Arabic manuscript belonging to the year 1587 ; and from this it would appear that the original home of the coffee-tree is to be found in the southern parts of the highlands of Abyssinia, where it is undoubtedly a native. Thence it was introduced into south-western Arabia, and through the Arabs it became known to Europeans. It is to this fact that the tree owes its specific name of *arabica*, while the generic name, and the ordinary name of the plant and its product, is derived from that which was given to it by the Arabs, and this again is possibly derived from Kaffa, the name of one of the highland districts of Abyssinia whence the tree was originally brought. The introduction of coffee into Arabia must have taken place at least as early as the eleventh century, but even in the middle of the sixteenth century the beverage was still unknown at Constantinople. About a century later still (in 1652) the first coffee-houses were started in London, and these soon became favourite resorts of the wits and men of letters of the time ; but in

England the drinking of coffee was gradually given up to a large extent in favour of tea, which was introduced even more recently. On the mainland of Europe, on the other hand, coffee has come more and more into favour ; and it is also largely consumed among the people of the United States. Relatively to population, the largest consumption of all is in Holland, which is a natural consequence of the extensive commerce between the home-country and its coffee-growing possessions in the East. In that country the total consumption of coffee has amounted in recent years to nearly 19 lbs. per head ; in Belgium it is about 13 lbs. ; in Sweden 13 ; in the United States 12 ; in France about 10 ; and in the United Kingdom less than 3 lbs. per head. The total consumption of coffee all the world over is still increasing.

The following table shows the proportion of this total furnished by the principal coffee-producing countries :—

—	Per cent. of total export.				—	Per cent. of total production.		
	1852–1862.	1872–1882.	1909–1913.	1931–1935.		1884–1888.	1909–1913.	1931–1934.
Brazil	52·0	50·8	70·2	64·3	Brazil	63·1	63·6	65·5
Java	20·1	14·3	1·5	6·4 [1]	Dutch E. Indies	10·3	3·0	4·0
Ceylon	8·7	7·5	0·0	0·0	Central America	8·0	5·0	7·0
Hayti	4·0	5·4	3·2	1·5	San Domingo	4·2	3·0	1·5
Venezuela	3·9	5·2	4·7	5·0	Venezuela	3·3	4·2	2·3
British India	1·7	3·6	1·2	0·4	Porto Rico	2·5	1·6	0·2
Sumatra and Celebes	3·6	3·0	0·8	—	British India	2·0	1·2	0·6
Colombia	—	—	—	13·6	Colombia	—	5·5	9·1
	94·0	89·8	81·6	91·2		93·4	87·1	90·2

[1] Dutch East Indies.

Brazil, which now, as the table shows, ranks first, gained importance on account of its coffee-production only in the nineteenth century. The tree was introduced into northern Brazil early in the eighteenth century, but not till about fifty years later into the region where it has since flourished so well. The coffee-producing region in Brazil lies between about 21° and 24° S., and is divided into two zones, one of which is traversed by a system of railways connected with Rio de Janeiro, and the other by a system connected more directly with the more southerly seaport of Santos. The coffee-growing area is, in general, the plateau with rich volcanic soils sheltered behind the coast range at a height of 600 to 2,500 feet above sea-level. In 1906–7, a year of very high production, Brazil furnished 80 per cent. of the world's total. In 1917 the area under coffee in Brazil had grown to about 4½ million acres, and an additional million acres in the State of Parana later came into bearing. The result was over-production, for Brazil was producing three-

quarters of the world's coffee. The Federal Government took over control of sales from February 1931 and large quantities of coffee were destroyed. The acreage of plantations has been reduced to just over 4 million and many growers have turned to citrus fruits.

The introduction of the coffee-tree into Java dates from 1650, when it was carried by the Dutch from Arabia. There plantations are generally at the height of from 2,000 to 4,000 feet above sea-level. Formerly, about two-thirds of the coffee grown in Java was grown on government plantations, but later the production of private plantations greatly increased. Coffee in Java suffered from disease (compare Ceylon), but the substitution of the disease-resisting Liberian coffee (*Coffea robusta*) for *Coffea arabica* in 1901 enabled disease to be largely overcome.

In Ceylon, the cultivation of coffee (which was introduced into the island when it was in Dutch hands, in the seventeenth century), after rapidly extending during many years, has rapidly declined since about 1880. This is partly due to the fact that during the prosperous period for coffee-growers plantations had been established too rashly, and in many cases in unsuitable situations, but chiefly to the ravages of insects and fungi. Most of the coffee-plantations have consequently been abandoned in favour of tea and other cultures and production has been virtually abandoned.

The figures in the table opposite show also an unsatisfactory state of things in India. The cultivation of coffee is said to have been introduced into that country about two centuries ago, by a native Mohammedan on his return from a pilgrimage to Mecca ; but it was only after 1840 that it spread with any great rapidity. The coffee plantations are mainly in Mysore and Madras on the eastern, and therefore more sheltered, slopes of the Western Ghats, to the south of about 15° N. The most desirable elevation on these mountains is from 2,500 to 3,500 feet above sea-level. The tree is also cultivated on much lower ground further east, but it is nowhere grown with success in northern India. The total acreage is now about 170,000.

Among the other areas of coffee production, those which have shown the greatest increase since the middle of the nineteenth century are the republics of South America (notably Colombia, Venezuela and Ecuador), Mexico and Central America (more particularly Salvador, Costa Rica, and Guatemala). In point of quality no coffee surpasses that of the district of Alta Vera Paz, northern Guatemala, where the cultivation is carried on with peculiar care. The Blue Mountain coffee of Jamaica is also famous. The African export is likewise rapidly increasing ; and here it may be mentioned that the State of Liberia gives name to a species of coffee (*C. liberica* or *robusta*) which is valuable from the fact of its being suitable to unsheltered low grounds even in equatorial regions, and being not so

readily attacked by the fungus which has ravaged the plantations of Ceylon. It has, for that reason, been introduced into other coffee-growing countries. Egypt, which, when coffee was first introduced into Europe, was one of the principal sources of supply, now furnishes coffee no longer; and the Arabian export is relatively small. Colombia now ranks second after Brazil as a producer and Venezuela fourth. Kenya, now with a high reputation for coffee, Tanganyika, Angola, and other parts of Africa all produce more or less coffee, and their output is increasing.

CACAO. Cacao, or cocoa, as it is more frequently but rather unfortunately called, is the product of an American tree *Theobroma cacao*, L., not to be confounded with the coconut-palm or the coca shrub. The tree comes into full bearing in twelve years (in favoured regions earlier) and continues to yield good returns for about thirty years, after which the yield begins to decline. The form in which it enters into commerce is that of cacao-beans, which are the seeds contained, to the number of thirty to fifty, in a red or green fleshy fruit from six to ten inches in length. These beans or seeds, which form an important article of diet among the natives of tropical America, are composed to the amount of half their weight of a fat known as cacao-butter, which has the valuable property of never becoming rancid, however long it is kept. The extraction of this fat has become a considerable industry. Being rather difficult of digestion, however, this fat is generally removed, as far as possible, in preparing cocoa for drinking or chocolate. Among the constituents that remain are flesh-forming compounds, on account of which cacao is highly esteemed for its nutritiousness.

Before entering into commerce the cacao-beans have, like those of coffee, to undergo a preliminary treatment, and the quality of the article depends greatly on the care bestowed on the necessary processes, the price of well-prepared beans being often more than double that of beans prepared in a more slovenly fashion. The first process is one for setting up fermentation, which removes a disagreeable bitter flavour, destroys the power of germination in the seeds, and prevents mustiness. The best cacao-beans are fermented for a period of five or seven days, by placing them in a heap along with plantain or other green leaves—a process during which so much heat is developed that the hand cannot be held in the heap for an instant. Afterwards the beans are dried in the sun, and they are then ready for shipment. When roasted and split, or broken, these beans form 'cocoa-nibs.'

The cacao-tree must be grown where there is little or no wind, which would break the heavy seed-vessels. It succeeds best under a higher temperature than coffee, and requires a great deal of moisture and a considerable depth of soil—much greater than that necessary for sugar. It therefore generally grows nearer the equator than

coffee, and mostly on low grounds. Yet it, as well as coffee, is liable to suffer from direct exposure to the rays of the sun, and is hence mostly grown under the shade of other trees. The world-consumption (especially in the form of chocolate) has trebled since pre-War years and the main area of production has shifted from tropical America (Ecuador, Brazil, and Venezuela) to tropical Africa (especially the Gold Coast and Nigeria, the Ivory Coast, and the islands of St. Thomé and Principe). Brazil is still, however, the second largest producer and Trinidad is important. These countries are all within thirteen degrees of the equator. Cacao is, however, also grown in the West Indies, not far from the tropic of Cancer, especially in Dominica and Jamaica.

Cacao became known in Europe early in the sixteenth century, and hence before either tea or coffee. Great Britain is now the country that has the largest consumption per head, without doubt in consequence of the great development of the chocolate industry in recent years. In Germany, Belgium, the United States, and Great Britain the annual consumption is between 3 and 4 lbs. per head.

RICE. Rice is the characteristic grain-crop of the plains in the monsoon area of the tropical and sub-tropical parts of south-eastern Asia. There are many varieties of this crop, some of which require very different conditions from others ; but those which are most abundantly produced not only demand a high summer temperature, but have to be grown in fields capable of being flooded at certain stages of their growth ; and it is these conditions which are afforded in the great river deltas and low-lying seaboard tracts subject to inundation during the summer rains of the area referred to. The fields in which the rice is grown are embanked to retain the water as long as may be needed, and where not sufficiently level by nature are carefully levelled by art ; and if the rains or the overflow of rivers are not sufficient to inundate the fields, the necessary water must be furnished by irrigation. The amount of flooding required or capable of being endured varies at different stages of growth. While the seedlings are in an early stage of growth, two inches of water are ample ; but when the stem is strong, high floods are almost unable to drown it. During flooding growth is astonishingly rapid, as much as nine inches having been known to be added to the height of the stalk in twenty-four hours.

From the highly peculiar conditions under which rice grows, it follows that where grown at all it is grown to the exclusion of almost every other crop ; and outside of the regions above indicated, where the surface and climate are specially adapted to this form of agriculture, the cultivation of rice is for the most part locally restricted to small areas presenting exceptional facilities for artificial inundation. There are, indeed, certain varieties of rice, known as upland or hill rice, which thrive on a drier soil, in India even at an

altitude of 8,000 feet; but these varieties occupy only comparatively small areas.

Yet, notwithstanding this local restriction of the rice-crop, it is probable that no other grain forms the staple food of so large a part of the human race. No tropical grain yields so large an amount of food from a given area of land; and hence the lowlands of Asia adapted to this crop are the most densely peopled parts of the continent. The total world production is estimated to be 120 to 130 million tons—almost exactly the total for wheat. The yield per acre for the world as a whole is estimated at 60 bushels—three times that of wheat or two and a quarter times if measured by weight. It forms the staple food grain of about one-third of the human race.

Japan (at least until recently), the Philippine Islands, parts of the East Indies, and Indo-China are probably the regions in which the great bulk of the entire population live mainly on rice. In India and China there are certain regions, and these in many cases the most populous, where rice is likewise the mainstay of the inhabitants. Still, it is estimated that, if we take British India as a whole, only about one-third of the population is rice-eating, and, since the native states lie mainly outside of the regions suitable for rice-cultivation, it may safely be inferred that a smaller proportion of the inhabitants of these states live on rice.

Relatively to this vast consumption, rice does not enter very largely into the commerce of the world. The great countries of Asia for the most part supply their own wants as regards this commodity within their own borders, and the trade in rice is hence principally a home trade. The density of population in most of the great rice-producing regions of the world does not allow of any great surplus for the commerce with Europe and America, and the supplies for these parts of the world are mainly obtained from the three comparatively small districts of Indo-China—Burma, Siam, and Cochin-China—the least densely populated of all the great rice-growing regions of the world. Of the total export of rice credited to India, between 80 and 95 per cent. is from Burma, until 1937 a province of India, although the rice-fields there cover only about one-sixth of the area of those of Bengal. Cochin-China and Siam are the only other countries that furnish any considerable supply to Europe. Rice is grown here and there in southern Europe, above all in Italy (Piedmont, Lombardy, and Venetia), so that rice is among the principal Italian exports of home production. It is also cultivated in the United States, on irrigated land in California as well as in Louisiana on the Mississippi delta.

A distinction should be drawn between the coarse rice which enters into international trade for industrial uses such as the preparation of starch and the smaller trade in finer qualities for

human consumption by white races. Table rice for Britain thus comes from Spain, Australia, and India as well as from the great exporters.

MILLETS. This name is given to several grain-crops, the most important of which are tropical. The two kinds most largely grown are the Great Millet (*Sorghum vulgare*, Pers.) and the Spiked Millet (*Pennisetum typhoideum*, Rich.). They are both among the leading crops of India and form the staple food grains of the drier regions of both India and China. Great Millet is also largely grown in Africa under the name of durrah. It is sometimes known as Guinea corn. Neither product enters largely into the commerce of the world. A species of sorghum is widely cultivated in the United States and elsewhere for green fodder. The so-called millets of the temperate zone, including *Setaria italica*, Beauv., agree only in yielding grain of a small size.

MINOR FARINACEOUS PRODUCTS. **Tapioca** is derived from the long tubers of the manioc plant (*Jatropha Manihot*, L.), a native of Brazil, but now largely cultivated elsewhere in the tropics of the Old World as well as the New. The tubers, before being subjected to heat and pressure, are highly poisonous, but the meal, a granular substance derived from them, and known as tapioca or cassava, according as it results from slightly different modes of treatment, is wholesome and nutritious. This meal forms a staple article of food among the people of Brazil and in many parts of tropical Africa, but it is imported into this country chiefly from the East Indies, Java, and Straits Settlements by way of Singapore. **Sago** is obtained from the pith of palms of the genus Sagus, principally *S. Rumphii*, Wild., and *S. laevis*, Reinw., largely cultivated in the eastern half of the Eastern Archipelago, including Borneo, whence it is imported by way of Singapore in sacks made out of the leaves of the palm itself. So easy is the cultivation of the palm, a single family is able to attend to a plantation containing 400 trees. West Indian sago is the produce of cycads. **Arrow-root** is derived from various sources. That which is distinguished as the true arrow-root is obtained from the rhizome of *Maranta arundinacea*, L., a native of tropical America, but now cultivated also in the Old World. This arrow-root is chiefly obtained from the West Indian island of St. Vincent. Other kinds are derived from India and elsewhere.

YAMS are the thick tubers of several species of *Dioscorea* which send up long slender annual twining stems. The tubers vary in weight from 1 lb. to 100 lbs. according to the species. When cooked the tubers acquire a mild taste like that of a potato and form the staple food of native races in many parts of the tropics—notably the wetter parts of West Africa and the South Sea Islands. They should not be confused with the **Sweet Potatoes** (*Ipomoea*

Batatas) also grown in tropical and warm temperate lands and eaten in the same way as potatoes.

SUGAR-CANE. The sugar-cane belongs botanically, like the cereals, to the family of the grasses, but its seed or grain is commercially of no value, and the plant is cultivated solely for the sake of the juice which is found in its stem, and which yields sugar. It is a tall plant, growing to the height of from ten to fifteen feet, and some of the stalks attain a thickness of more than an inch. Every year these stalks are cut down just before flowering, but the root-stock is perennial, and continues to throw up fresh shoots every year in sufficient quantity to be remunerative for thirty years in succession, though the usual rule is to renew the plants after five years. This is one advantage which it has over its great modern rival, sugar-beet. Great strides have been made in improving the yield of sugar from sugar-beet and, according to a world average, the beet is now richer in sugar than the sugar-cane. The reverse was formerly the case. The range of the sugar-cane in latitude is wider than that of coffee, but not so wide as that of tea. In the northern hemisphere it is grown successfully to the north of lat. 37° in the south of Spain, and in the southern hemisphere, in Natal and New South Wales, to about lat. 30° S. A moist soil being required for sugar-cane, the situation in which it is grown is very different from that of tea or coffee, but with too much moisture the juice will be watery.

Originally a product of eastern Asia (probably of Indo-China and the valley of the Ganges), the sugar-cane became generally known in the west only in comparatively recent times. The cane itself, and the knowledge of the mode of extracting sugar from it, would appear to have been introduced by the Arabs first into Egypt, and then, in the ninth century, into Crete, Sicily, and other islands of the Mediterranean. Subsequently it was introduced into Spain, which is now the only part of Europe where, under the protection of the government, it still flourishes. At the present day the cultivation of the cane is spread over all tropical and many sub-tropical countries, including the islands of the Pacific and the New World. The largest producer is now Cuba, where since the liberation of the island from Spain the production increased eight-fold from half a million to over four million tons but it has since dropped. In India the total production for native use (unrefined) is very large, but not equal to the home demand, and the production per acre is smaller than that of any of the great producers. Deficiencies in the home supply are made up by imports from Java, but recently great progress has been made with modern refining in India itself. In the Old World, Java, the Philippine Islands, China, Japan (Formosa), Mauritius, and Egypt are the chief exporters of cane-sugar. In the New World, in addition to the areas already mentioned, sugar-cane is a staple crop in Puerto Rico, Dominica, most of the British

West Indian Islands, and British Guiana, whilst the United States has large supplies in Louisiana and the Hawaiian Islands.

THE SUGAR INDUSTRY. Sugar, now regarded as a necessary of life by the very poorest in almost all parts of the world, was a substance unknown to the classical nations of antiquity. There could be no more signal illustration of the results of the development of commerce and the stimulation of agricultural and mechanical industry due to commerce. Even about four hundred years ago refined sugar, in the form of the white crystalline substance with which we are familiar on our tables, was still an unknown article. The invention of the process of refining sugar into the form known as loaf-sugar is ascribed to a Venetian about the end of the fifteenth or beginning of the sixteenth century. As late as the beginning of the eighteenth century sugar was still a comparative rarity in Europe. At that date the total amount consumed on the continent in one year is estimated to have reached only about 50,000 tons. Now the amount annually consumed in the United Kingdom alone approaches 2,000,000 tons—forty times as much. Apart from some kinds of timber, cane-sugar is, next to rice, the bulkiest of tropical commodities in proportion to its value, and demands a great amount of shipping. It should be mentioned that the consumption just mentioned is exclusive of molasses as well as of **glucose,** a kind of sugar derived from the starch of maize or potatoes, and imported into this country chiefly from the United States, to be used as a sweetener in jam-making, in brewing, and for many other purposes.

Down to the nineteenth century the sugar-cane was almost the sole source of supply of the sugar consumed in Europe. The presence of sugar in beet-root was discovered by a Berlin apothecary named Marggraf, as far back as 1747. Before the close of the same century another Berlin chemist, named Achard, devised a method of extracting the sugar from beet; but the first attempts to do this were not commercially successful. At a later date great improvements were introduced in the method of extraction by the French Comte de Chaptal, and after 1820 the making of beet-sugar became firmly established as a branch of national industry in various countries in Europe. Before the War sugar-beet became every year a more formidable rival to sugar-cane, and in 1913 the world's supply was derived almost equally from the two sources, and in considering the development of the sugar industry it will be instructive to compare the relative advantages of these two rivals.

On the side of sugar-cane there is the advantage of easy culture and relative natural richness in sugar, and likewise the fact that it is grown in tropical and sub-tropical climates where labour is at its cheapest. Beet suffers under the disadvantage of requiring high cultivation (more especially plentiful supplies of potash manures), of

requiring to be re-planted year by year, and of being grown where labour is relatively dear, at least in comparison with the countries of the sugar-cane. With modern selection, however, a given weight of sugar-beet is now actually richer in sugar than a corresponding weight of cane. On the other hand, beet has the advantage of being grown where population is dense, and where accordingly the market is close at hand both for the raw material used in the refineries and also for the manufactured product; where, too, in consequence of that density of population, manure is abundant, or the advanced state of commerce renders it easily procurable; and where the abundance of capital, and the consequently low rate of interest on money, favours the erection of the best machinery for dealing with the raw material. Moreover, it has the further important advantage of yielding a refuse material of much higher value than that obtained from the sugar-cane. The canes after being deprived of their sugary juice are chiefly used for fuel; but the refuse beet, the beet-pulp, as it is called, besides being a useful manure, especially as returning potash to the ground, is a valuable food for cattle—a circumstance of special importance in thickly peopled countries.

There are other indirect advantages in connection with the sugar-beet industry. The extraction and refining of the sugar are conveniently complementary to the growing of the beet both as regards place and time. The amount of waste in the raw material makes it important to have the factories near the farms, all the more since that waste matter ceases to be waste when returned to the farms. That favours the establishment of at least one manufacturing industry in country districts. At the 1907 industrial or occupations census of Germany, 40 per cent. of the refinery employees were in towns of less than 2,000 inhabitants, and an additional 33 per cent. in towns of 2,000 to 20,000. Then the factory work is confined to three months in the year, September to December, when agricultural work is slack, so that the agricultural industry can easily spare labour for the factories, all the more easily since the refinery labour is to agricultural only in the ratio of 2 : 13.

As affecting the competition between sugar-beet and sugar-cane at the present time, probably the most important factor in deciding on which side the general advantage lies is the superiority of the methods and machinery for extracting sugar from the beet. In the case of the sugar-cane, the stems of the plant are as a rule merely crushed between rollers which still leave in the cane a considerable proportion of the juice. The juice that is pressed out is boiled and otherwise treated, part of the substance then forming the crystals of sugar, while the remainder flows away in the form of a syrup known as molasses. From the country of production cane sugar is usually exported in an unrefined condition, in which it is called raw sugar, and the raw sugar is further treated and refined, more syrup flowing

away during these further processes. In the case of sugar-beet, the roots containing the sugar are first treated in one of two ways, either of which extracts from their substance a larger proportion of the juice contained in them than is usually derived from the sugar-canes. One method is to subject them to the action of powerful presses ; but a still better method is that known as the diffusion process, the invention of a German named Robert, but improved and first made practically useful in France (by Charles, and afterwards by Peret of Roye). According to this process slices of the beet-root are subjected to the action of hot water either in a number of different tanks or in one continuous cylinder, but in either case in such a manner that the water ultimately gets thoroughly saturated with juice. The after-treatment of the beet-juice differs in some respects from that of cane-juice, but is in the main similar. The general result of the improvements that have been brought about in the cultivation and treatment of sugar-beet is such that whereas in 1836–37 18 cwts. of beet were required to produce 1 cwt. of raw sugar, only between 10 and 11 cwts. were about 1882 needed for that purpose, whilst now the world average is only 6 cwts.

Till lately the cane-growers relied solely upon the greater richness of their raw material to enable them to compete with the producers of beet-sugar. An economy has been effected by a change of system in some cane-growing districts. Instead of each planter extracting the sugar from his own cane, different estates are connected with a single sugar-factory, the juice from the canes being pumped through pipes leading to reservoirs belonging to the factory. This is known as the *usine* or factory system. Even this method does not produce the most economical results unless the separate estates are large enough to be equipped with the best crushing machinery. Otherwise it is found best to convey the cane itself to the central factory to be crushed there.

Here it should be mentioned that there are few industries the pursuit of which has been more generally affected by government regulations. In all the chief beet-sugar-producing countries of Europe special fiscal regulations have been made with a view of encouraging that industry. In some cases a direct bounty has been granted on exports. In other cases a drawback on exports has been allowed at such a rate as to favour exportation of sugar. In all cases a protective customs duty has been imposed. As the law stood in France at the beginning of the twentieth century a small direct bounty was granted on exports, but the encouragement to the industry was given mainly in connection with the revenue raised on production. The tax on home-consumed sugar was 60 francs per 100 kilos., but the sugar manufacturer paid the full tax only on the assumption that nearly 13 cwts. of beet were required to produce 1 cwt. of raw sugar. For any production in excess of that rate the

taxation was considerably reduced. Now the yield of sugar was in fact much above the proportion indicated. The law was thus effective in accomplishing its two main ends of increasing the production and quality of sugar-beets produced in France (mainly in the five northernmost Departments) and the manufacture of sugar. In Germany and in Austria-Hungary at the same date direct bounties on the export of sugar were also granted, but these were likewise of small amount (at most under 2*s.* 6*d.* a cwt.), but a heavy protective import duty, amounting to twice the duty charged on the home consumption of sugar, enabled the manufacturers of raw sugar and the refiners in both countries to organise the industry in such a manner as practically to increase the bounty on the industry. In Belgium and Russia bounties were paid on export indirectly. The consequence of such regulations was that in all the countries mentioned the production of beet-sugar was stimulated to a degree greatly in excess of that corresponding to the geographical conditions. The price of the sugar on the world market was excessively lowered. A heavy burden rested on the sugar consumers and taxpayers of the bounty-paying countries, and British consumers formed almost the sole large population that benefited. Hence, in this country there was a consumption of upwards of 80 lbs. of sugar per head, as against about 34 lbs. in Germany and only 17½ lbs. in Austria-Hungary. Repeated international efforts were consequently made to get rid of the system, and at last all the European countries concerned, except Russia, agreed to a convention for the abolition of the system. The convention came into force on September 1, 1903, and under it Great Britain, with the other parties to the convention, agreed to impose a special duty not less than the equivalent of any bounty on production on sugar imported from countries granting that bounty. It was agreed that no surtax or tax in excess of that levied on home-grown sugar should exceed 6 francs on 100 kilos. if refined, or 5 fr. 50 centimes on raw sugar imported should be imposed. All the parties to the treaty agreed to admit at the lowest tariff sugar from the contracting states. In 1908 Russia was admitted to the convention on agreeing not to authorise the exportation with return of or exemption from excise of quantities of sugar exceeding one million tons in the aggregate in the six years from September 1, 1907, to September 1, 1913. Among the apparent results of these agreements may be noted a marked increase in the consumption of sugar per head in Germany, an increase in the proportion of unrefined as compared with refined sugar imported into the United Kingdom, and in Russia a rapid increase in the area under beet from 1908 to 1913. The agreements must also be regarded as a contributory influence in restoring the predominance of cane over beet in the sugar production of the world. The United Kingdom withdrew from the convention in 1918, and subsequently

approved the principle of granting a preference to empire-grown sugar and of encouraging the home production of beet-sugar.

Besides the two great sugar-producing plants, sugar is obtained in greater or less quantity from various other sources. In the eastern parts of Canada and in the north-eastern states of the Union, sugar is largely obtained from a juice which flows out on tapping the trunk of various species of maple and above all the sugar-maple (*Acer saccharinum*, Linn.). From this source is obtained a small proportion of the native-grown sugar of the United States but one which has a special use. In tropical countries sugar is largely obtained from various species of palms—in India from the Indian date palm, the Palmyra palm, the coco-nut palm, the toddy palm, and the sago palm.

CINCHONA. Cinchona is the name of a Linnæan genus of tropical trees, several species of which yield a bark invaluable in medicine. No other commodity enters so largely into the commerce of the world solely on account of its medicinal uses. For medicinal purposes the bark is made to yield extracts, the best known of which is quinine. Compounds from these extracts are also used. The medical uses are very various, but it is chiefly as affording a sovereign remedy for the malarial fevers incident to tropical climates that this bark is so highly prized. The species of Cinchona are all natives of the eastern slopes of the Andes, from about 7° N. to 22° S., occupying, generally in scattered groups, a belt of from about 3,000 to 10,000 feet above sea-level, a belt in which they are exposed to copious rains, enjoy a tolerably constant temperature, and plenty of sunshine. The species most valued for their bark, among which are *Cinchona succirubra*, Pav., yielding the red bark of commerce, *C. calisaya*, Wedd., and *C. ledgeriana*, Moens, yielding the more valuable yellow bark, and *C. officinalis*, L., flourish best when grown within eight or ten degrees of the equator at the height of from 4,000 to 7,000 feet above sea-level, where the mean temperature is from about 55° to 70° F. In higher latitudes they are, of course, confined to a lower elevation.

The great value of this bark led to numerous attempts to introduce the trees into other parts of the world. Originally, the region from which it was introduced into Europe belonged entirely to the domain of the old Empire of Peru, and subsequently to the Spanish viceroyalty of Peru ; and hence it became known by the name of Peruvian bark. After the establishment of the various South American republics, that of Colombia furnished the chief supply. The first attempts to introduce the tree into tropical parts of Asia were made by the Dutch. The first tree was introduced into Java in 1852, and a few years later the cultivation of the cinchona was a successful government industry on that island, where it is now prosecuted by private individuals as well as by the government.

To India the tree was brought direct from South America, by Mr. (afterwards Sir) Clements Markham in 1860. A government cinchona plantation was soon after established on the Nilgiri Hills, and a second was afterwards set going in Darjeeling, in lat. 27°, on one of the rainiest parts of the Himalayan range.

But it was the Ceylon plantations which first greatly affected the international commerce in this drug and its price. Down to about 1880 Colombia remained the chief source of supply of this bark for the London market; but so rapidly was cinchona cultivation extended in Ceylon that the British imports of the bark from that colony increased from 7,452 cwts. in 1881 to upwards of 115,000 cwts. in 1886. Since then the Colombian supply has dwindled to insignificance, and Ceylon and India have been driven from their high place in the production of this commodity by attacks of disease and a fall in price so that Java has now a virtual monopoly, supplying over 90 per cent. of the world's total in many years.

TROPICAL VEGETABLE FIBRES. Of these the most important (apart from cotton) is **jute**, which is derived from the bast chiefly of two species of a genus of plants known to botanists as *Corchorus*. These are slender-stemmed annuals, from about eight to twelve feet high. The cultivation of the plant on a great scale for the sake of the fibre is almost confined to the northern and eastern parts of Bengal. It is grown on every variety of soil, but by preference on the alluvial sand-banks thrown up by rivers, for which situation it is peculiarly adapted by the fact that, except in the early stages of growth, it can stand heavy flooding without injury. The fibre, which is extracted from the stem by various processes, including that of retting, has long been woven into cloth called gunny-cloth by native hand-loom weavers, the cloth being chiefly used for making sacks and packing for cotton, coffee, and other products. Till about 1835 the use of this material in weaving was almost confined to India; but about that date it began to be imported into Dundee, where it has risen to be the chief article used in spinning and weaving, especially after the Crimean war (1854–56) temporarily reduced the Russian supplies of flax and hemp, on which the industry of that town to a large extent depended. For a time Dundee was the only seat of jute-factories, but the industry later spread to other towns of the United Kingdom (especially to such as are also engaged in the linen industry), and factories were established on the Continent and in India itself. The Indian factories are almost all confined to Bengal, and indeed to the immediate neighbourhood of Calcutta, jute being the Bengal industry which rivals that of cotton in Bombay. Gunny-bags and other coarse packing-materials are still the chief product of the jute-factories. Jute cloth has been called the 'brown paper of the wholesale trade,' hence those countries which export raw produce take the bulk of the output.

The bulk handling of grain in Canada, Argentina, and Australia has lessened the demand for jute sacks and there are other substitutes. Jute yarn, either alone or in combination with other yarns, is now also employed in the manufacture of various other fabrics, such as carpets, furniture-coverings, curtains, and even plushes and velvets.

Hemp. Since about 1880 a fibre known as henequen or sisal hemp has been largely used (first in America) for the making of binder twine. It is derived from the fleshy leaves of various species of Agave, but chiefly the *Agave rigida*, Mill., a native of Yucatan, which has been widely introduced into other parts of the tropics with a similar climate, as into Tanganyika.

Next in importance to jute among tropical fibres in European commerce is Manila hemp, so called from the chief place of export. It is obtained from the long leaves of *Musa textilis*, Nees, a plant belonging to the same genus as the banana and plantain, found wild on the Moluccas and Philippine Islands, and cultivated chiefly on the latter. Along with constant humidity and a high but fairly evenly distributed rainfall it requires a well-drained soil, and is hence often put on steep mountain sides. The fibre is from six to nine feet in length, and is separated from the leaf by hand-labour or by mechanical strippers. Though more difficult to work and more brittle than hemp fibre, it is capable of being made into ropes of great tenacity and endurance, and it is very largely exported for that purpose. The finer fibres are woven by the natives of the Philippine Islands into delicate tissues, and in Europe they are likewise used (often in combination with silk) in making curtains, coverings for furniture, and other fabrics.

In Eastern countries (India, China, Japan, and the Eastern Archipelago) fibres derived from the bast chiefly of two varieties of *Bœhmeria nivea*, Hook., a species of plants belonging to the nettle family, have been used from the earliest times in spinning and weaving. The fibres, which are known in India as **rhea**, in the Mala Islands as **ramie**, and to Europeans by the name of China grass, are pre-eminent amongst vegetable fibres for strength, fineness, and lustre, and produce an almost silky-looking fabric, called China cloth or grass cloth, which in China is very generally used for the making of summer clothing. Its various qualities render it fit for being used in making, besides ships' cables, all sorts of woven fabrics, from the coarsest to the finest—sail-cloth, table-linen, 'alpaca,' velvet, and even lace and cambric. The chief obstacle to its use at present is its high price, arising from the difficulty with which the fibre is separated. The fibres are attached to the core of the stem of the plant and to one another by a gummy substance which cannot be removed by the ordinary process of retting and has to be abstracted by treatment with chemicals. When examined under the microscope the individual fibres are seen to be interrupted at

intervals by enlarged nodes. The presence of these nodes makes the fibre difficult to work.

Of other tropical or sub-tropical fibre-plants it will be sufficient to enumerate some of the more important, since none of them has, so far at least, attained any considerable place in international commerce. A leguminous or pod-bearing plant, *Crotalaria juncea*, Linn., yields from its bast the **sunn-hemp** of India. In the same country the *Hibiscus cannabinus*, Linn., a member of the same family as the cotton plant, is largely cultivated, especially in the north, for its fibre, which is also obtained from the bast, and is known as **Deccani** or **gambo-hemp.** Several trees belonging to the same family furnish a soft silky wool, which, like the true cotton, is an investment of the seeds, but which, being too short for spinning, is used for stuffing cushions and other similar purposes. These are known as **silk cotton trees,** and the most important are *Bombax Ceiba*, Linn., a native of tropical America, *Bombax malabaricum*, DC., a native of India, and *Eriodendron anfractuosum*, DC., a native of India and the Eastern Archipelago, from which later region the product of this tree has been introduced into commerce by the Dutch under the name of **kapok** or **vegetable down.** On account of its extreme buoyancy it is used in making life waistcoats. The fibres of the leaves of the screw-pine, *Pandanus odoratissimus*, Linn., a native of southern Asia, Madagascar, and the islands of the Pacific, enter into commerce under the name of **vicua,** or **vacoua,** as a material for coarse sacking. Those from the outside of the stem of the palm, known to botanists as *Attalea funifera*, Mart., are exported from Brazil, under the name of **piassava,** as a material for brushes and brooms. Another palm-tree, the ubiquitous coco-nut palm, furnishes, among its numerous other products, the fibre called **coir,** which is commercially by far the most important of all these minor fibres. The fibre forms a thick matting on the outside of the nut, and is exported from all tropical countries as a material not only, like the piassava, for brooms and brushes, but also for the making of door-mats, and even for the making of stair-carpets, and various other purposes.

TROPICAL FRUITS. Oranges, limes, dates, and some other fruits are all imported into the United Kingdom and other parts of the temperate zone more or less from the tropics, but the tropical portion of the supply is relatively less than the supply from outside the tropics. **Bananas** are the only fruit which enters into world commerce mainly from the tropics, and this is a trade that has grown important as the result of increased knowledge of cold storage and careful organisation. They are the product of the large plant known to botanists as *Musa sapientum*, L., and its varieties, including a hardy dwarf variety known as *M. Cavendishii* or *chinensis*, suitable for cultivation in the temperate zone, and now largely cultivated in

the Canary Islands. All the varieties require high temperatures, a great deal of moisture, and a deep soil. When these conditions are satisfied they are grown almost universally in the tropics, but chiefly in small groups near the huts of natives. Central America (above all, Costa Rica), Colombia, the Canaries, and the West Indies are the principal parts of the world in which the cultivation is carried on, at no little expense, on an increasingly large scale for export, and the United States, the United Kingdom, and certain European countries are the principal markets. The trade has grown to enormous proportions since the construction of special steamers with the requisite cold storage where the bananas can be kept at the exact temperature of 52° F. The bananas grow in 'hands,' of 10–12 fingers along a main stem forming a 'bunch.' The average 'bunch' is over 100 bananas, each plant yielding one bunch. Other species of Musa, including *M. paradisiaca*, L., which yields the plantain, are also grown to a large extent in the tropics as food, but do not enter into world commerce. The name plantain is, however, loosely used in many parts of the world as practically synonymous with banana.

The import into the United Kingdom increased from about 1¼ million bunches in 1900 to upwards of 7 millions in 1913. There was a steady increase in post-War years to nearly 15 million bunches in 1929. If we take 37 bunches as equal to a ton (see Rung, p. 15), this latter amount is equal to about 405,000 tons, or about 1,800,000,000 bananas. This represents an annual consumption of forty bananas per head of population.

RUBBER was formerly known as caoutchouc or india-rubber. Of the older names, the first is a South American name, and hence suggests the region whence the first knowledge of the substance was introduced into Europe, and whence still come limited supplies. It was found in use in various parts of America by the early discoverers. On the occasion of the second voyage of Columbus (1493) it was noted as being used in Haiti for the making of balls. Torquemada mentions in 1615 that it was then derived from a Mexican tree, and used by the Spaniards to waterproof their cloaks. The Portuguese found it in use at an early date in Brazil for the making of syringes (whence its Portuguese name of *seringa*), but the substance and its uses first became generally known in Europe through a paper read to the French Academy by La Condamine in 1736. For more than eighty years after that almost the sole use of the substance in Europe was for the purpose which the second name suggests, namely the rubbing out of pencil-marks. At the present time it would be difficult to say how small a fraction of the consumption of rubber that use represents, so that this second name is a constant reminder of the way in which a great industry may grow out of small beginnings. The 'India' prefixed to the

term 'rubber' indicates the source from which the chief supplies of the material were got when the use was limited. The first important extension of the use of rubber was due to the invention in 1823 by Mackintosh of the waterproof fabric named after him. A still greater extension followed when Goodyear in America in 1842, and independently Hancock in England in 1843, discovered the method of hardening caoutchouc by treating it with sulphur. This is known as the process of **vulcanising.** A small proportion of sulphur (5 to 7 per cent.) incorporated with the rubber makes the compound adapted for a great variety of mechanical purposes, such as nearly everybody is more or less familiar with. A larger percentage (39–84) makes the equally familiar hard black compound known as ebonite. Rubber has been made synthetically in the laboratory, but there appears to be as yet little prospect of the synthetic production of rubber on a commercial basis, and at any rate not of that quality of rubber which combines in a high degree the important properties of compressibility and elasticity.

Rubber is the coagulated latex or juice derived from a variety of trees, all tropical. To prevent putrefaction the coagulation must be effected within about 24 hours of the collection of the juice. For many years the largest supply was obtained from trees of the allied genera Hevea and Micrandra, growing in the Amazon valley, in Brazil, Bolivia, and Peru, not in clumps, but widely scattered amongst a great variety of other trees, as is usual in well-watered parts of the tropics. The species from which most was obtained is the *H. brasiliensis*, Müll.-Arg. (*Siphonia elastica*, Pers.). Rubber from all these trees is known from the place of export as **Pará rubber.** The trees yielding the best juice are those growing on tracts of land which are annually flooded. Those growing where the roots are always submerged yield too watery a juice, and those that grow on higher ground beyond the reach of floods a juice too viscid. Another Brazilian tree, *Manihot Glaziovii*, Müll.-Arg. (an ally of the shrub yielding tapioca), furnishes Ceará rubber, which owes its commercial name to the province from which it is derived. The region to which it belongs is one in which rains may occasionally be plentiful, but is exposed to prolonged periods of drought, the rains sometimes failing altogether even in the rainy season. In Central America and the northern parts of South America, an inferior caoutchouc is obtained from *Castilloa elastica*, Cerv. In India, rubber has been obtained from a species of fig, *Ficus elastica*, Roxb. (Assam rubber); in Borneo, from a species of Willughbeia; in other parts of the Eastern Archipelago, from *Urceola elastica*, Roxb.; in Africa, principally from various species of twining plants belonging to the genus Landolphia, but also, in Lagos and other parts of West Africa, from *Funtumia elastica* (= *Kickxia elastica*, Preuss). All the species mentioned are trees, most of them confined to latitudes

well within the tropics, the only exception being the *Ficus elastica*, which, however, grows in a part of India with a characteristic tropical climate.

Largely owing to the practice of what the Germans call ' robber economy ' (whereby the rubber-bearing trees are ruthlessly cut down and killed in order to obtain the maximum yield), wild rubber has come to form a very small percentage of the world's supply. The bulk of the rubber supply of the world is now obtained through the produce of regular plantations, in which it is possible by careful tapping to obtain a steady supply of juice from the same trees for many years in succession, and to effect other economies not practicable by the old mode of collection. Experiments began to be made with both Pará and Ceará rubbers as far back as 1876 and 1877. Through the authorities of Kew Gardens both trees have been introduced into most suitable parts of the tropics in both the Old World and the New. But the progress of rubber-planting was at first slow. At the end of last century it was still considered doubtful whether plantations with expensive European company management would pay. But in this case the forcsight of business men has been justified. In 1905 the quantity of plantation rubber on the world market was estimated at only 145 tons ; five years later it had increased to upwards of 8,000 tons. In 1905 the total production was estimated at about 65,000 tons, about half of which came from or through Brazil, in 1913 about 101,000 tons, of which nearly half was plantation rubber. In 1923 the total production of rubber was estimated at 410,000 tons, more than 90 per cent. being plantation rubber, which probably occupied not more than 15,000 square miles, or about half the area of Scotland. In 1929 total production of rubber was 860,000 tons, only 8 per cent. coming from Brazil and 92 per cent. plantation. The Hevea rubber-tree takes ten years to mature, and this leads to difficulties in forecasting the production of rubber, and to this is added the complication arising from the fact that rubber is now more and more grown by natives, especially in Sumatra and Java, on their own plots. Further commercial uncertainties are introduced on the demand side by sudden extensions of the demand for old uses and the introduction of new uses. Underproduction led to a boom in 1909–10 in which latter year the British import price rose to nearly £30 per cwt., to sink to about £13 in 1913. A post-war boom was then followed by another slump in 1921–22.

In 1850 the import of rubber into the United Kingdom was far below 500 tons ; in 1870, 7,600 tons ; in 1900, 25,600 tons ; in 1913, 70,000 tons ; in 1923, 80,000 tons ; in 1929, 172,000 tons. In the latter year only about one-half per cent. came from or through Brazil. Over-production was only narrowly averted by restricting output in the British rubber-growing countries (especially Ceylon

and Malaya). World production from 1922 to 1925 was between 400,000 and 500,000 tons, of which over 95 per cent. was plantation rubber. Later the restriction on output was removed and the price of rubber fell to a very low level (to less than $2\frac{1}{2}d.$ per lb. during part of 1931). Despite the increase in world consumption to nearly a million tons annually on an average of the years 1926 to 1929, there was serious over-production. This led to an agreement between the main producers whereby output for 1934–38 (world annual average, 1,160,000 tons) was allotted according to a quota.

The plantations are chiefly in Malaya, Ceylon, the Dutch East Indies and British Borneo, southern India (especially Travancore), and Lower Burma, and nine-tenths of the world's rubber came from these areas, but there are some plantations also in tropical Africa both east and west, as well as in the American countries, in which rubber-trees grow wild.

Gutta-percha is the hardened juice of several other tropical trees, but the chief supply in this case comes from the East Indies, especially the Malay Peninsula and the Dutch East Indies, Singapore being the chief place of export to Europe. It is obtained from trees of the family of Sapotaceæ. Formerly, that known to botanists as *Dichopsis Gutta*, Benth., furnished the bulk of the supply, but this tree was so ruthlessly destroyed in obtaining the juice that it was almost exterminated and the genus Payena, especially *Payena Leerii*, Kurz, now contributes most of the product. Gutta-percha is used for many of the same purposes as rubber, and is capable in many respects of the same treatment. Mixed with carbon, it can readily be vulcanised like rubber, by the addition of sulphur, either to the soft or hard state. The former practice of destroying the trees to get the juice is now largely given up. They may be tapped and preserved like rubber trees. Another variety of gutta-percha, known as balata, is obtained from South America, mainly British Guiana, and is the product of another member of the Sapotaceæ, the bullet tree *Mimusops balata*, Crueg. With the increasing use of rubber from *Hevea braziliensis* the use of other types has decreased.

Half the world's rubber is purchased by the United States; the United Kingdom, France, Germany, Italy, Japan, and Russia are the other chief importers.

COMMODITIES (*continued*)

D. Products of Various Climates.

VEGETABLE OILS, OIL-SEEDS, AND OIL-CAKE. Almost all vegetable oils are extracted from the fruit or seed. The plants supplying oil vary widely in their character, ranging from small herbs to tall trees. Almost all of them belong to warm countries, that is to say, either to tropical lands or the warmer parts of the temperate zone, or if they are not confined to these regions, are there of most importance for their oil.

The uses of vegetable oils are various. Some, such as olive-oil, ground-nut oil, poppy, sesame, and cotton-oil, are largely used as table oils, for cooking, preserving, &c.; others, including rape, cotton, and olive, are used for lighting though for this purpose they have largely been replaced by mineral oils; others, such as rape, hemp, and palm-oil, are employed in lubricating machinery; others are used in medicine and perfumery; others in making candles; others, known as drying oils, of which linseed is the most important, in mixing colours for painting, as well as in various manufactures; very many of them in the manufacture of soap, which has become one of the chief uses of almost all vegetable oils, except drying, whilst the manufacture of margarine and other butter substitutes has become another chief use.

Olive-oil. Among vegetable oils, the first place may properly be given to the product of the olive. This tree, originally a native, in all probability, of western Asia, is suited rather to a warm temperate than a sub-tropical climate with dry summers, and the site best suited to it is that which has a dry and, above all, a gravelly limestone soil, and is well sheltered. These requirements are presented in many parts of the Mediterranean region (including Portugal), throughout which (except in Egypt) the tree is highly characteristic. Indeed, it may be fitly taken as marking both in altitude and in latitude and longitude the limits of this type of climate in different parts of the world, the tree having now been introduced wherever that type of climate prevails. According to Theobald Fischer the number of olive trees in Spain is estimated at about three hundred millions, in Italy one hundred millions. In Spain there are extensive forests of it on the southern slopes of the Sierra Morena

and on a tract 56 miles long in the upper part of the Guadalquivir valley, east-north-east of Cordova. In Italy, Apulia, the western seaboard of Calabria, Tuscany, and the west side of the Gulf of Genoa are its principal seats. In France the area, in the lower part of the Rhone valley, devoted to it is much smaller but the cultivation is more careful. Nowhere in recent years has its cultivation extended more rapidly than in the Tunisian Sahel, an area of about 230 square miles, with Sfax as its chief port. There on the estates producing the best quality it is planted at the ratio of only about $6\frac{1}{2}$ to the acre, whereas in Spain and Italy the ratio is as much as 50 to 110 to the acre. It is a slow-growing tree, taking from 15 to 20 years to attain its maximum yield.

In the Black Sea region the distribution of the olive illustrates in an interesting manner the influence of climate. The tree is absent from the south of Russia, except on the southern slopes of the Yaila mountains in the Crimea, which affords the necessary protection against cold northerly winds. Under the shelter of the Caucasus Mountains it occurs in Trans-Caucasia, where it grows both wild and under cultivation in many districts. In the north of Asia Minor the olive thrives admirably along the whole coast from Trebizond to Samsun, and in ancient times extended to Sinope; that is, it occupies or once occupied the whole of that part of the coast looking north-eastwards and participating in the shelter afforded by the Caucasus Mountains. It is excluded, however, from that part of the coast which looks north-westwards and is liable to be swept by cold winds from southern Russia.

Outside of the regions considered in the preceding paragraphs, the tree may be grown in many parts of the world, but there are few of these in which olive-oil is an important product. The tree thrives in Mexico, and also in Peru and other parts of South America, where it was introduced as early as 1560; but in these parts its fruit is said to be unfit for use in the extraction of oil. It has long been cultivated with success in South Australia, and olive plantations are so extensive in California that home-grown table olives have driven the foreign article out of the markets of the United States.

In quality the bulk of the Italian oil is inferior to that of France (the Provence oil), but the oils of Lucca in Tuscany and of Liguria are unsurpassed. The export of Italian oil is chiefly to the United States, Argentina, and France. France consumes much more oil than it produces. The United Kingdom derives olive-oil more largely from Spain than Italy, and the other countries from which it is chiefly brought to England are France, Turkey (Asia Minor, in some parts of which olives are very abundant), Greece, Syria, and Morocco. The inferior kinds are much used in the making of soap.

Cotton-seed oil is now very largely used as a substitute for olive-oil, from which it can scarcely be distinguished in flavour. The seed is chiefly exported from Egypt and India, and the refining of the oil has become a great industry at Hull. Besides the refined oil the seed yields much oil that is mixed with beef products to form compound lard, and the inferior kinds are used in the making of soap, candles, and gramophone records. The refuse cake or meal is used as both a cattle-food and a fertiliser, and the hulls in the form of bran can be used without any other feed to fatten cattle.

Linseed, **rape-seed**, and the **sesame** of commerce, together with ground-nuts, are the four principal oil-seeds furnished by India, and they are all exported for the most part before the extraction of the oil. **Linseed**, as already intimated, is merely another name for flax-seed. The great bulk of the British import of this article is derived from the Argentine Republic, British India, and Russia. The useful property of drying on exposure to the air, a property already referred to as rendering this oil the most important of those employed in mixing colours for painting, as well as in making varnishes, adapts it for many other uses, which help to give it a very important place in the arts. When treated with sulphur it forms what is called linoleum, which is a soft substance capable of being used for many of the purposes of india-rubber or gutta-percha. Dissolved and mixed with colouring-matter, it is then employed to cover various textile fabrics with a waterproof varnish, thus forming **linoleum floorcloth**, which consists of ground cork and linoleum mixed together and pressed upon canvas—the ordinary name for which is now linoleum.

Rape-seed is the seed of two or three species of the cabbage genus (*Brassica*) extensively grown in Europe as well as India. The oil made from it was formerly the chief lighting agent in North and Central Europe; and **colza-oil**, which is that derived from *Brassica rapa*, var. *oleifera*, DC., is still of some value for use in lamps. It is now more largely used as a **lubricant**, and even for this purpose has been largely replaced by mineral oils.

The sesame of commerce is the seed of a herb which was grown for its oil by both Egyptians and Babylonians of ancient times, as it now is in India and Asia Minor. The oil is called in India til or jinjelly, and is used as a table-oil as well as for lighting. The seed is the richest in oil of all the important oil-seeds, yielding oil to the amount of more than half its weight. The beniseed of West Africa is derived from a member of the same genus. **Poppy-seed**, which yields an oil used for cooking and for mixing colours, as well as in soap-making, is exported chiefly from India, the bulk of the export going to France. From India there is now a large production of **ground-nuts**, the oil obtained from which is now employed for the

same purposes as olive-oil; large supplies of this commodity are obtained from the tropical parts of West Africa. Ground-nuts, also known as monkey-nuts or earth-nuts, can be grown in very light sandy soils which cannot be used for other crops. The plant is a member of the pea and bean family and the root nodules on the plant are the homes of nitrogen-fixing bacteria which enrich the soil. **Castor-oil,** which is expressed from the seeds of a tropical tree or shrub belonging both to the Old and New World, enters into commerce chiefly in the form of the oil, and only to a small extent in the form of oil-seeds. India is the chief source of supply. The oil is used in soap-making as well as in medicine, but now more as a lubricant for aeroplanes than for any other purpose. In China it is used as a table-oil.

Two palm-trees yield large supplies of oil. That which yields the oil generally distinguished as **palm-oil** is the tree known to botanists as *Elæis guineensis*, Jacq., that is, the Guinea oil-palm—a name by which it is very appropriately designated though it is found more or less in West Africa between 10° N. and 10° S. The oil is mainly derived from the fibrous matter of the fruit investing the hard kernel, and was formerly used largely in soap-making, but now chiefly for purposes giving it greater value, as in the making of margarine and high explosives. Another valuable oil used as a substitute for olive-oil as a table-oil is obtained from the kernels, which are mostly exported for treatment. Another kind of palm-kernel, derived from a species of Attalea, is exported from the north-east of Brazil, under the name of babassu nuts. **Coconut-oil** is expressed from the kernels of the coconut, which grows very widely on tropical islands and tropical coasts, but is seldom found far from the sea. The dried kernels of the coconut also enter largely into commerce under the name of **copra.** To a smaller extent it is exported in a flaked condition as **desiccated coconut** for use in confectionery.

Soya-bean oil has long been known and used for cooking in China, but it was not until the first decade of the present century that methods were devised of getting rid of a peculiar rancid flavour in the oil. The beans and oil, mainly from Manchuria, soon became the leading export of China as they now are of the new state of Manchukuo. Cultivation is spreading elsewhere—in the United States in particular—but the soil in a new area requires to be inoculated with a bacterial culture before the crop can be grown. The oil is widely used for soap-making and for other purposes in common with most vegetable oils.

Oil-cake is a general name for the masses of crushed seeds that remain after the oil has been pressed out of them, and it is now very largely used in the feeding of cattle, which it fattens very rapidly; frequently also as a manure. It is chiefly derived from linseed,

rape-seed, and cotton-seed, but also from coconut, in which form it is known as *poonac*.

Of the ethereal, essential, or volatile oils—that is, oils that can be evaporated and recondensed without changing their nature—the most important is the oil or so-called **spirit of turpentine**, obtained by distillation from the resin of various firs, pines, and other cone-bearing trees. It is very largely used to dissolve resins, and in the making of paints and varnishes, as well as for cleaning. Almost all the British import is from the United States.

GUMS, RESINS, AND OTHER VEGETABLE EXTRACTS, exclusive of those used chiefly as Drugs, Narcotics, Tans, or Dyes, and Vegetable Waxes. **Resin** is a general name for a variety of substances, which are all originally fluids in the tissues of plants, but which become solid, which are all more or less clear or translucent, though generally with a tinge of colour, which are all inflammable and insoluble in water, but soluble in alcohol and the essential oils, such as oil of turpentine. They generally exude in a fluid state from the stems and branches of trees, but are sometimes found in hollow spaces in the wood, or lying in the ground where the trees yielding them have grown. **Gums** resemble resins in appearance and origin, but differ in being soluble in water, but insoluble in alcohol and essential oils.

The resin which forms by far the most important commercial commodity, so far as quantity is concerned, is that which is entered in trade returns as **rosin**. It is used in the making of paper and soap, and for many other familiar purposes. It is the substance that remains behind from the distillation of turpentine after the oil of turpentine has been separated, and hence is imported, like the latter commodity, mainly from the United States. From Russia and Sweden, the European countries which have the greatest abundance of cone-bearing trees, comparatively little rosin or oil of turpentine is exported; but, on the other hand, these are the chief sources of supply for **wood-tar and pitch**, which are obtained from the timber of the same group of trees, by burning it in covered pits in such a manner that no flame is produced. From tar, creosote, an excellent preservative of timber, is made by a complicated process. The export of tar from the United States is comparatively small, though there is a large production of the article for home use. **Burgundy pitch**, which was formerly used as an external application in medicine, is properly a kind of resin obtained by treating the natural resin of the silver fir (**common frankincense**, as it is called), and when genuine is principally imported from the continent of Europe; but the substance so called is now largely manufactured from rosin or turpentine.

The other resins of commerce are principally used either in the making of varnishes and lacquers, or for burning as incense. The

chief of those employed for the former purpose are **dammar,** the product of a cone-bearing tree (*Dammara orientalis*, Lamb.) which grows in the Eastern Archipelago; **kauri gum,** the resin of the New Zealand pine, which is another species of Dammara (*D. australis*, Lamb.); copal, obtained from various tropical trees; and **sandarach** the product of a cone-bearing tree belonging to Algeria and other parts of north Africa. **Kauri gum** is principally derived not from trees still standing, but is dug in large lumps out of the earth over a large part of the North Island of New Zealand, where forests of this tree formerly existed. It forms the finest of all resins for varnishes, but has now become scarce. **Copal** (frequently known as gum copal) is obtained both from the Old World and the New. The best sort is said to be that derived from a tree growing in the west of Africa (Angola and Benguela), but it is also obtained from the east of Africa, India, the Eastern Archipelago, the West Indies, and South America. **Mastix,** the product of a species of *Pistacia* which grows in various parts of the Mediterranean region, but above all on the island of Chios, is now not so much used in the making of varnishes and lacquers as formerly, but is still largely consumed in the Levant as a material for chewing to cleanse the teeth and strengthen the gums, as well as in other ways. **Dragon's-blood,** a red resin which exudes from several trees belonging to the tropics of the Old and New World, is imported for the colouring of varnishes and for use in making wood-polishes.

To the list mentioned in the last paragraph may be added **amber,** which is nothing else than the resin from certain extinct cone-bearing trees. It is chiefly employed in the making of a variety of ornamental articles. It is principally obtained on the Baltic coast of Prussia between the Frisches Haff and the Kurisches Haff, whence the article, which was very highly valued in antiquity was conveyed by several routes to the civilised countries round the Mediterranean. At the present day amber seems to be most valued for ornamental purposes in China, where it is regularly imported in considerable quantity. The substance is occasionally obtained at various points on the shores of the Mediterranean, and more regularly on the coasts of China and Siam. Some kinds of **copal** are, however, frequently substituted for the true amber, and sold as such, being hard enough to be applied to the same purposes as the genuine article.

Of resins used to burn as incense, the most important are olibanum, or the **true frankincense,** the product of various species of trees belonging to the genus *Boswellia*, natives of Africa, southern Arabia, and India; **myrrh,** the product of species of *Balsamodendron* belonging to the same regions; and **benzoë,** derived from the bark of a tree called *Styrax Benzoin*, Dryand., which grows in Indo-China and the Eastern Archipelago. This last substance is

largely used not only in the ceremonies of the Roman Catholic Church, but also in the religious services in Eastern Asia; in India and China it is also employed in the making of cosmetics, and by the rich to fumigate their rooms. In Japan it is mixed with tobacco for smoking.

The **gum arabic** of commerce is derived from various species of Acacia growing in different parts of the world. The best kind is imported into Europe, most largely from northern Africa and especially from the Anglo-Egyptian Sudan, and is mostly derived from the *Acacia senegalensis*, Ait., a tree found throughout the Sudan from the west to the east of Africa, and also from an allied species in the arid portion of India immediately to the north-west of the Deccan Peninsula. The trade in that portion of the gum which is introduced into Europe from the Senegal region is in French hands, and it is imported into other countries mainly from France. The *A. arabica*, Willd., which grows over the whole region occupied by the former species, and also in southern Arabia, supplies a portion of this gum; and so also does the *A. gummifera*, Willd., a native of the countries lying to the north of the desert of Sahara. Large quantities of inferior gum are exported from the African ports on and near the Red Sea. A useful and strong adhesive gum is obtained from *A. Catechu*, Willd., which is more widespread in India, and is mentioned elsewhere, p. 598, as supplying a tanning and dyeing material, the export trade in native Indian gums still awaits development. Among other sources of supply of this commodity are South Africa, where it is obtained from the *A. horrida*, Willd., and Australia, where it is chiefly derived from the *A. pycnantha*, Benth., which supplies also a powerful tanning bark.

The only other important gum of commerce—not counting the so-called gumlac—is **gum tragacanth,** the product of several species of *Astragalus* (see below), belonging to the countries surrounding the Mediterranean. It is principally exported from Smyrna, in Asia Minor, and is used as a vehicle for applying discharges (chemical agents for removing colour) in calico-printing, as well as for other purposes. **Camphor** is mainly derived from a species of cinnamon (*Cinnamomum camphora*), which grows in Japan, Formosa (where it is a government monopoly), central China, and the Malay Peninsula, and is extracted by distillation from the wood and leaves, but also from a large Bornean tree, the *Dryobalanops aromatica*, on which it appears as an exudation from the fissures.

SPICES, STIMULANTS, AND CONDIMENTS. The most important spices are all products of the torrid zone. Four—pepper, ginger, cloves, and cinnamon—are entered separately in the 'Annual Statements' of British Trade, and the order in which they have been mentioned indicates their relative importance as imports. As

to the former importance of pepper and other spices in commerce, see p. 3.

Under the name of **pepper** several different articles are sold in the shops. **Peppercorns** and **black** and **white pepper**, which makes up the great bulk of the pepper of commerce, are all derived from one species, a twining and climbing plant, *Piper nigrum*, Linn., belonging to southern India, the Eastern or Malay Archipelago, and Indo-China, and largely cultivated in those regions for the sake of its spice, which is the most generally used of all spices, among both rich and poor. The peppercorns are the whole berries, and black and white pepper the same ground, with this difference, that to make white pepper the peppercorns are first deprived of their outer skin by steeping them in water for several days. Ninety per cent. of all the pepper imported into this country comes from the Straits Settlements, but more than half of this import is the product of Java, Siam, and French Indo-China, collected at Singapore. A considerable quantity, however, is the product of the Straits Settlements themselves, and most of the remainder is derived from the Malabar coast of India. Another species of Piper (*P. longum*, Linn.) produces **long pepper**, which is the dried unripe fruit of that shrub ; a native of the same regions as the last, but extending to a more northerly latitude. **Cubebs** are the berries of another species (*P. Cubeba*, Linn.), belonging to the same region, and a fourth species, the **betel** (*P. Betel*, Linn.), furnishes the leaves which are used along with areca-nut and other ingredients to compose the favourite stimulant chewing-mixture of the people of India. **Cayenne pepper** is the product of a totally different plant, being the ground pods of different species of **Capsicum**, one of which has smaller pods, used entire in pickling, under the name of **chillies.** Originally natives of South America, they are now grown in tropical countries in the Old World as well as the New, and even in the warmer parts of the temperate zone, as in Spain and Hungary. The United Kingdom is the great market for all kinds of peppers, and re-exports on an average from a half to two-thirds of her import.

Ginger, a spice known to the ancient Greeks and Romans, and much liked in the Middle Ages, is the dried root-stock of a plant known to botanists as *Zingiber officinale*, Rosc., a native of south-eastern Asia, but now largely cultivated also in the West Indies and the British settlements in West Africa. Almost all the British imports of this commodity are from parts of the British Empire—principally the British East and West Indies and Sierra Leone. The West Indian article has the higher average value.

The **cinnamon** of the shops is the product of two different trees, in both cases the bark (ground or unground) of the smaller twigs. One of these, the dearer and better of the two, is derived from the *Cinnamomum zeylanicum*, Nees., or Ceylon cinnamon, and is dis-

tinguished in commerce as the true **cinnamon,** although it seems probable that the *cassia lignea* of commerce, the product of the *Laurus cassia* of Linnæus, was the cinnamon of the ancients, the so-called true cinnamon not having been discovered till the thirteenth century of the Christian era. The Ceylon cinnamon is very exacting as to soil and climate, and hence is restricted to limited areas. All but a small fraction of the import of this commodity into Great Britain is still derived from Ceylon, though the tree is also grown on the islands of the Eastern Archipelago, and has been introduced into the West Indies and South America. The *Laurus cassia* is much more widespread, growing wild (as well as cultivated) in the tropical and sub-tropical parts both of the Old and New World ; but the greater part of the **cassia lignea** of commerce is obtained from China.

Of the other vegetable products used as spices two of the most important are cloves and nutmegs (including mace), both produced chiefly on the Moluccas or Spice Islands, but imported into the country mainly by way of Singapore. **Cloves** are the flower-buds of *Caryophyllus aromaticus*, Linn., dried before opening ; **nutmegs** are the kernel of the fruit of another tree, *Myristica moschata*, Willd., and **mace** the investment of that kernel. Both trees are natives of the Moluccas, to which the Dutch for a long period confined them, cloves to Amboina, nutmegs to Banda, retaining for themselves the monopoly of the trade in these spices. Both trees have now, however, been introduced into other parts of the world ; both of them into the Straits Settlements and British India ; and the clove-tree into many parts of the torrid zone, both in the Old World (Zanzibar, &c.) and the New. **Kola nuts,** which contain caffeine, and are largely used as a stimulant in tropical Africa, are derived from a tree (*Cola acuminata*, Schott and End.) which has also been introduced into the New World. The leaves of the **coca** shrub (*Erythroxylum coca*, Lam.), a native of the east side of the tropical Andes, have been known since the discovery of those regions to impart when chewed an extraordinary power of enduring fatigue, and now enter into commerce as the source of the alkaloid cocaine.

The greater quantity of the remaining unenumerated spices are derived from the British West Indies, and among those having this origin the most important is **pimento,** or **all-spice,** the unripe dried berries of the *Pimenta officinalis*, Lindl., which is cultivated chiefly on the island of Jamaica. Among the minor spices in European trade may be mentioned **cardamoms,** which are, however, the most valuable of all Indian condiments. They are grown to such an extent on the mountains of southern India, that the name of Cardamom Hills is given to the range forming the background of the native state of Travancore. **Vanilla** is the pod of a twining orchid originally belonging to Mexico and South America, but long since

successfully introduced into the tropics of the Old World, including the Islands of Bourbon and Mauritius, which now rival Mexico in the production of this commodity. **Cummin,** the seed of a plant native to the upper Nile regions, but introduced at an early stage into southern and eastern Asia, was an important spice in ancient times and in the Middle Ages, but now plays little, if any, part in European commerce. **Star-anise,** the seeds of a tree (*Illicium verum*, Hook. f.) belonging to southern China, is imported into Europe in considerable quantity as a flavouring for spirits. The chief spices and condiments grown in European countries are **fennel, caraways, coriander, aniseed,** and **mustard.**

DYE-STUFFS FROM THE VEGETABLE KINGDOM. Some of the most important of these are extracted from the heart-wood of certain trees, and the woods yielding them (chiefly the products of tropical countries) are imported into industrial countries under the heading dye-woods. One is **logwood,** a wood of a dark-red colour yielding an extract which is used in dyeing blue, brown, and black. It is the wood of *Hæmatoxylon campechianum* (Linn.), a lofty tree which owes its specific name to the fact that it is very abundant in the district of Campeachy in the Mexican province of Yucatan. It is, however, chiefly imported from the West Indies and British Honduras. The other principal dye-wood is **fustic,** a wood yielding a yellow colouring-matter, but chiefly used in combination with other materials to produce differently coloured dyes. It is the product of a tree known as *Maclura tinctoria*, Don., and is now exported mainly from Nicaragua under the name of **mora-wood.** Of late years mineral dyes have rendered much less important this class of merchandise.

Other dye-stuffs of vegetable origin are either parts of herbs from which dyes may be extracted, or extracts used in dyeing, whether derived from herbs or from the wood of trees. Of such dye-stuffs a noteworthy one is **indigo,** the fine blue dye obtained chiefly from a shrub *Indigofera tinctoria*, Linn., a native of the tropical parts of south-eastern Asia. Till the end of last century it was an important import from India, where it was cultivated chiefly in Bengal and Madras, but since the successful production of **indigotin,** an indigo dye produced synthetically, the production of vegetable indigo has greatly declined.

Other dye-stuffs of vegetable origin, all formerly of considerable importance, are madder and safflower, besides cutch, gambier, myrobalans, and sumach, which are also used in tanning (p. 275). **Madder** was known as madder, madder-root, garancine, and munjeet, garancine being the colouring principle extracted from the madder-plant, and munjeet, Indian madder (*Rubia cordifolia*, Linn.). The European madder (*Rubia tinctorum*, Linn.) was formerly grown in various parts of the mainland of Europe, being the principal

source of certain dyes, chiefly red, but also yellow ; but the discovery in 1868 of the method of preparing similar dyes much more cheaply from coal-tar products has gradually extinguished this industry, as well as the extraction, except for local use, of other red and yellow dyes from the flower-heads of the **safflower** (*Carthamus tinctorius*, Linn.).

Cochineal, a red colouring-matter obtained from the dried bodies of an insect (*Coccus cacti*, Linn.) belonging to the same genus as that which yields the lac of India (see below), and the same genus as the kermes insect which lives on the kermes oak in the Mediterranean region, and yields another red dye, the ' scarlet ' of the Bible, is still imported from the Canary Islands, where the plant on which the insect feeds (*Opuntia coccinillifera*, Linn.) is largely grown for the sake of this product.

Of the dye-stuffs now rarely used, one of the most important was **annatto** or **arnotto,** a reddish-yellow dye chiefly used for silks, and therefore more largely imported into France than any other country. It was derived from the fruit of a tree (*Bixa orellana*, L.) belonging to tropical America, and was chiefly imported into France from Guadeloupe. A lichen, **archil** or **orseille** (*Roccella tinctoria*, DC.), growing on tropical rocks and trees, is imported from the Canary Islands and various parts of the tropical regions of Africa and America. From it two dyes are obtained—a purple-red dye and a blue dye—the latter of which is distinguished as **litmus** and, among other uses, is employed to colour papers used by chemists as tests for acids, which change such papers from blue to red. **Gamboge,** the hardened sap of a tree belonging to Indo-China and the Eastern Archipelago, *Garcinia morella*, Desv., and **turmeric,** an extract from the underground stem of *Curcuma longa*, Roxb., a plant belonging to the same regions and also to China and India, are imported as yellow dyes, but are more used in the making of coloured varnishes and for other purposes in the arts than for dyeing fabrics. Turmeric is used, like litmus, to colour test-papers employed in chemistry.

The dyes already mentioned include only a very small number of those which can be extracted from members of the vegetable kingdom. In India it is said that over three hundred dyes and tans are known. But the use of most vegetable dyes has given way before those already referred to as made from products of coal-tar.

TIMBER. This is one of those bulky commodities which require a vast amount of shipping for their transport. About the end of the nineteenth century the annual import into the United Kingdom was about 6½ million loads, each 50 cubic feet (half a register ton of shipping), in addition to about 200,000 tons of furniture and other hard woods, and manufactures of wood (entered in our tables only by value) to the value of upwards of £1,000,000. The British import of pit-props alone amounted then to nearly

two million loads of the value of more than £2,000,000. The average post-War import has been 10 million loads. Timber is, for the most part, exported on a large scale only where there are exceptional facilities for water transport. Eighty per cent. of the timber of commerce is '**softwood**' obtained mainly from **firs** and **pines.** It is exported in the form of logs, deals, deal ends (deals less than six feet in length), planks, and boards ; sometimes in the form of shooks, that is, sets of staves for barrels and of recent years commonly as ready-made doors, frames, &c. The four European countries exporting in pre-War days an excess of timber were Russia, Sweden, Norway, and Austria-Hungary ; and the United Kingdom is still that with the greatest excess of imports. In America, the United States and Canada both export timber and timber products to the value of several millions sterling. The chief Canadian exports under this head to the United Kingdom are in the form of sawn or split, planed or dressed fir. Canada and Russia are the only two countries which now have a large reserve of 'natural' softwood, but many countries of Europe have a steady output from plantations. A further 18 per cent. of the world's timber consists of temperate hardwoods of which oak is one of the chief. **Oak** is a very large export from both the American countries named, as well as from central Europe. Elm, beech, walnut, maple, are among the other important timber-trees of the temperate zone, and the spotted wood of the New-England sugar-maple, known as bird's-eye maple, is highly esteemed for cabinet work. The enormous consumption of soft timber (principally firs and pines) in the production of wood pulp for paper may be noted also.

Although there are enormous reserves of tropical hardwoods at present only 2 per cent. of the world's requirements are of this type. They include beautiful cabinet woods, but the trees in tropical forests are very mixed and it is difficult to extract one particular type.

Mahogany is the wood of *Swietenia mahogoni*, L., a large tree belonging to tropical America, including the West Indies. The best quality is obtained from the Island of Hayti ; inferior sorts from Cuba, Jamaica, Mexico, and British Honduras. When grown on marshy ground, like most of that of British Honduras, the timber is comparatively soft and of poor quality. Under the name of mahogany various red cabinet woods are now largely imported from West Africa. **Teak** is of the highest value for shipbuilding and in construction generally, being as hard and durable as oak, and having at the same time this advantage over oak, that while the latter timber is said to promote rust, teak contains an oil which tends to preserve iron by preventing rust. It is chiefly imported from Burma and Siam, but is largely grown in other parts of the East Indies. It is obtained from regions of moderate rainfall, between 40 and 80

inches. As the wood when full of sap is heavier than water, the tree has to be killed by cutting off a ring of the bark, to allow of it being floated down stream. **Ebony** is a name given to the wood of various trees. The hardest, blackest, and most valuable kind is the product of *Diospyros Ebenum*, Koe., a native of India. **Rosewood** is another name given to several different kinds of timber, the best being derived from various species of Cæsalpinia ; the best of all, it is said, from *Cæsalpinia brasiliensis*, Sw. The term **cedar** is used with equal laxity, being applied to a number of trees whose wood is thought to resemble that of the true cedar of Lebanon in colour or appearance or both. The cedar of Lebanon furnishes none of the timber of commerce. The **white cedar** is derived from *Juniperus oxycedrus*, L., *Cupressus thyoides*, L., and other trees ; the **red cedar** (used in making pencils) from *Juniperus virginiana*, L., and *J. bermudiana*, L. Most of the cedarwood of commerce comes from the West Indies and Central America. Red woods derived from two gigantic species of Eucalpytus—**jarrah,** or *Eucalyptus marginata*, and **karri,** or *E. diversicolor*—are now largely imported from Western Australia for the manufacture of paving blocks, furniture, and other purposes. The wood of the jarrah is also very useful in making piles to be sunk in water, as it has remarkable durability in water both salt and fresh. They both grow in restricted areas in the south-west of the state.

FURS. The fur trade has some peculiar features. It is the most valuable of those which depend for the greater part of their supplies upon the hunter, including the seal-fisher. It is a trade that deals in the skins of a great variety of different animals of all sizes and differing greatly in value, and hence its products are collected in a few great markets where merchants and manufacturers can supply themselves with the kinds best suited to their own special market or branch of industry. The regions from which the furs are collected are almost exclusively the temperate and cold parts of the world, the finest sorts being all from the colder regions. Most of the furs come, therefore, from the northern hemisphere, where there is the greatest area of land in the latitudes from which they are derived. The furs derived from North America and the adjacent seas are collected, to a large extent, at the **New York** market, but in still greater quantity reach the **London** market, which also receives large supplies from the southern hemisphere as well as from Europe. The furs of Siberia and northern Russia are principally collected at Gorky; but second only to London is the fur-market of **Leipzig,** which receives supplies not only from the great markets already mentioned in the east and west, but also direct from almost all the minor markets in different parts of the globe. This pre-eminence it owes to its central situation, not only as regards the source of supply, but also as regards the region in which furs are mostly worn, fur garments

being more in demand in central and eastern Europe than in western Europe, where the winters are relatively mild. They are also largely worn by the well-to-do classes in China.

To enumerate all the animals that contribute a share to the fur trade would be to mention nearly all the land mammals belonging to the colder parts of the earth, as well as a good many of those belonging to more temperate regions, and several marine mammals. Among those which supply the greatest number of skins to the trade are **squirrels, hares, rabbits, musk-rats** (a kind of beaver belonging to North America), **coypus** (a beaver-like animal whose skins are imported, under the name of nutria skins, mainly from the region round the River Plate in South America), **cats**, and **seals**, all of which are, except the last, slaughtered for their fur to the number of at least a million annually; but among those which yield the furs of greatest value are the **sable** (from Russia and Siberia, and from North America), the **stoat** or **ermine** (from Europe and Asia), the **sea-otter** (from the west coast of North America), the **black** or **silver fox**, and the true **fur seal**. The coat of the blubber-seal is of but little value, and the true **fur seal**, which yields the valuable sealskin of commerce, is a species belonging to a group distinguished from other seals by the possession of external ears. This species is obtained chiefly on the Pribilov Islands, two small islands in Bering Sea, where they come annually to breed. Under the regulations of the Government of the United States only limited numbers may be killed there every year. The species is also hunted by Canadian sealers in Bering Sea and the North Pacific.

The fur trade of British North America was for a long time the monopoly of a company called the Hudson's Bay Company, which was founded in 1670, and had conferred upon it the exclusive right of capturing fur-bearing animals, and buying furs in the entire region draining into Hudson Bay. A still wider range of territory was brought within their monopoly at a later date, and remained so till 1860, when the company's claims were again reduced to the tract embraced by the original grant. This also was sold in 1869 to the Dominion of Canada, though the company still retained in its possession certain stations and a portion of the land. During the enjoyment of its monopoly enormous profits were made by the company, which purchased by means of beads and cheap trinkets the furs of animals trapped or otherwise captured by native Indians and brought by them to their agents. Now there are several other fur-companies operating in the same region. The Russian fur trade has been from the first to some extent in the hands of the Russian government, a portion of the revenue of the Siberian provinces being paid in the form of sable, squirrel, and other skins. Large numbers of skins are now derived from Australia and New Zealand, but these are chiefly **rabbit-skins** of little value. An important

development in the fur trade in recent years has been the breeding of certain fur-bearing animals, notably the silver fox, in farms, especially in Canada.

MEAT. Not very long ago considerable quantities of the meat supply of the United Kingdom were obtained from the larger domestic animals imported alive ; but the trade in these is of comparatively little importance (except from the Irish Free State), and is apparently destined to cease altogether. By far the largest supplies of imported fresh meat are now, however, obtained by the process of refrigeration. This process was first tried, with more or less success, about 1875 in America in the chilling of beef, a process by which the meat is cooled only to a temperature of 29° to 30° F., and is not hardened. Both beef and mutton are also carried in large quantities frozen at temperatures of from 10° to 15° F., in which case they have to be thawed out before being ready for consumption. The freezing of mutton was attempted in Victoria and New South Wales towards the end of the seventies, but it then proved a failure. The trade in frozen mutton began in earnest in 1881. The principal market for these products has always been the United Kingdom. In that year the import first exceeded 10,000 carcases (all from Australia). If it had not been for these supplies it is probable that the cost of living would have been greatly enhanced in this country, and a more or less serious check given to the development of our manufactures. The principal sources of frozen meat are Australia, New Zealand, the Argentine Republic, and other South American countries. Chilled beef comes mainly from the Argentine. By 1890 the total import into the United Kingdom had risen to nearly 3,000,000 carcases of mutton and lamb, besides 76,000 quarters of frozen and more than 150,000 tons of chilled beef. In 1907 the mutton and lamb carcases imported exceeded 10,000,000, and in 1910 the number was nearly 13,000,000, and about the same in 1913. By 1913, however, the import of frozen beef had grown to upwards of 2,600,000 quarters, or about 197,000 tons, and the chilled beef to above 260,000 tons. The total import of chilled and frozen beef and mutton in that year was 720,000 tons, which was estimated to make up about 40 per cent. of the total consumption of the United Kingdom, and this estimate of course does not take into account meat imported in other forms—bacon, hams, &c. The official estimates of the proportion of imported to home supply of meat when these are included was 40 per cent. in 1936. In 1917 during the War the import of chilled and frozen beef and mutton fell to 433,000 tons, but in 1929 had risen to 869,000 tons. At present the import of frozen meat into other European countries (Italy, France, Germany, &c.) is small, but perhaps the most striking feature of this trade in recent years is that whereas in 1907 the United States was the largest supplier of meat to this country (in the form

of beef and live cattle), in 1935 the supply received from that source was very small, and the United States had become a large importer of Australian and South American meat. Owing to the extension of arable farming in Argentina, the ranching lands have been restricted and much of the meat is produced on smaller farms where fodder is grown for the fattening of the animals. There has also been the search for new ranching lands and the tropical grasslands are likely to become an important supply of meat in the future, *e.g.* Rhodesia. The once important trade in 'jerked' beef (beef cut into strips, salted and dried) has almost disappeared, but there is a big trade in partly cooked tinned meat (corned beef, tongues, &c.) and in extracts such as Bovril, Oxo, &c. The liability of cattle to various devastating diseases, such as caused by tsetse fly, is temporarily hindering the extension of ranching, more particularly in certain parts of Africa. The practice of preserving by cold has been extended to rabbits, poultry, fish, fruit, milk, eggs, cheese, butter, hops, and other commodities.

Pork, bacon, hams, and lard for the British market were all formerly derived mainly from the United States, but Denmark, Canada, and Poland now lead in bacon. Lard comes mainly from the 'Corn Belt' of the United States. **Poultry and game** are derived mainly from the adjacent parts of the European Continent.

MISCELLANEOUS PRODUCTS CHIEFLY OF ANIMAL ORIGIN. Before the War Russia, Denmark, Austria-Hungary, France, and Italy were the only European countries of importance showing a large excess of exports over imports of **eggs**; whereas the United Kingdom, Germany, and Holland have an import many times as large as their exports. The majority of eggs imported are, of course, those of domestic fowls, but the gathering of eggs from coasts and islands frequented by sea-birds, principally in northern seas, is an important source of livelihood in many places. Here it may be mentioned that it is not merely for food that eggs are imported. They have various important uses in the arts. The white of egg (egg-albumen) is employed in book-binding and the finishing of fancy leathers; as a clarifying agent in sugar-refining and making wine; as a means of preparing one kind of photographic paper, and for other purposes. The yolk of egg is employed in making the finer kinds of tawed leather. The practice of preserving eggs by drying attained great importance during the War, but dried eggs have not yet been an important article of international trade. Far more important is the trade in eggs removed from the shell and exported in tins, especially from China. **Butter,** like eggs, is imported into the United Kingdom from adjacent countries—Denmark (supplying more than 30 per cent. of the total), France, and Holland; but cold storage enables us to receive enormous supplies from across the Atlantic, and especially from New Zealand

and Australia (Australasia supplying more than a third of the total), and Argentina. Holland supplies most of the imported **margarine**, which is made from either animal fats, vegetable fats (mostly from coconuts or the oil-palm), or a mixture of both, and flavoured with lactic acid ferments so as to be almost indistinguishable in taste from butter, for all but the best qualities of which it is now proving a keen rival. **Cheese** was formerly supplied more largely by Canada than any other country, but the first place has been wrested from her by New Zealand. A cool summer climate is a favourable condition in the cheese-making districts of both (in Canada chiefly Quebec). Holland, Italy, and Switzerland furnish most of our European imports.

Fresh milk is mainly only an article of local trade ; but **condensed milk**, made by adding sugar, or some other ingredients with or without sugar, to the milk, and then evaporating the milk to a greater or less extent, is exported from the Netherlands, Belgium, France, Norway, and other countries, and milk is also now largely prepared and exported in the form of powder. **Ghī**, or butter clarified by boiling, is an article of commerce in India and neighbouring countries. **Koumiss**, the fermented milk of mares, is a favourite drink among certain nomadic tribes in central Asia, and is now largely made in Russia also, on account of its being esteemed a remedy for consumption. An imitation koumiss is now made for the same use in other countries from asses' and cows' milk.

Of animal products not used as food, the only ones of sufficient importance as mercantile commodities to have been entered in the trade returns of the United Kingdom are bones, ivory, horns and hoofs, hair and bristles, feathers, sponges, tallow, isinglass, whalebone, and animal oils and wax, along with which it is convenient to treat of honey. **Bones** are employed in making a great variety of useful and fancy articles, and **bone-ash** is a common ingredient in the compositions used in the manufacture of pottery. Being in a great measure composed of phosphate of lime, bones are likewise employed in the making of manures. For manufacturing purposes they are chiefly imported from Brazil, the Argentine, and India ; and for use as manure, chiefly from the East Indies and the Argentine Republic.

Ivory is the dentine or tooth-substance forming the tusks of elephants, hippopotamuses, walruses, narwhals, and other animals. **Elephant ivory** is distinguished by its lozenge-shaped curvilinear markings. **Hippopotamus ivory** is denser and harder than that of the elephant, and of a superior and more enduring whiteness, but the solid pieces of this kind of ivory are all small, so that it can be used only in making small articles. **Walrus ivory** is inferior to that of the hippopotamus, and that of the narwhal is coarse and of little value. The total annual consumption of ivory in Europe, the United States,

British India, China, and Japan was estimated towards the end of last century at about 1,100 tons, of the value of about £1,000,000. The largest share in the trade belonged to the United Kingdom, which imported about 350 tons annually. Of the total 1,100 tons, about 1,000 tons were estimated to be derived from the elephant, three-fourths of this quantity being obtained from Africa, the remainder chiefly from the East Indies, though a small supply was obtained from the remains of the Siberian mammoth, which have furnished ivory to China for seven centuries. In recent years the trade in ivory has become very small. Under the name of **vegetable ivory** a substance is imported into Great Britain; but this substance has only a fraction of the value of true ivory, and is used for making buttons and toys. It is mainly the hard albumen of the seeds of a palm, *Phytelephas macrocarpa*, Ruiz & Pav., and the chief country of origin is Colombia.

Horns and Hoofs, which are principally employed in the making of combs, buttons, knife-handles, &c., are most largely imported from India. **Horse-hair,** which is used in upholstery as a stuffing, is imported chiefly from Russia, Siberia (by way of China), and the Argentine Republic; cow-hair, now used principally in the making of felt for roofing and for clothing boilers and pipes of steam-engines, is brought into this country mainly from the European mainland. **Pig's-bristles,** the material chiefly used in the making of ordinary brushes, are supplied from abroad, chiefly by Germany, Russia, and China. Even the trade in **human hair** is not inconsiderable. France, Italy, and Germany are the countries that furnish the markets with most of this article, and Marseilles is the chief centre of the trade, less important than formerly. **Feathers** are classed under two heads—feathers for beds, and ornamental feathers. The former are imported into Britain from various countries, near and far, and include the soft down derived from the eider-duck, which is obtained chiefly from Iceland, but likewise from many northern cliffs haunted by sea-birds. Ornamental feathers, owing to the vagaries of women's fashions, have little of the importance they once possessed. Ostrich feathers were formerly exported from South Africa to the value of over £3,000,000 but fell in one year to only £125,000, and the output is now worth less than £50,000.

Sponges consist of a horny internal skeleton of marine animals whose living portion consists of a coating of slime, which has to be removed before the sponge becomes an article of commerce. The animals yielding the best sponges live at a depth of only fifteen to twenty feet, and hence, when not covered by sea-weeds, can easily be seen from the surface. The sponges are generally obtained by divers, but a submarine vessel from which the fishers can seize the sponges by means of specially constructed tongs and deposit them

in a basket on the bowsprit has been devised. An electric light with reflectors enables them to see the sponges through a glazed spy-hole. The best sponges are all obtained from the eastern half of the Mediterranean Sea, from the Gulf of Cabes in the east of Tunis to the coast of Syria. In this area is also included the Dalmatian coast of the Adriatic as a sponge-yielding region. The fisheries are carried on mainly by Greeks, Sicilians, Arabs, and Dalmatians, and it is the first-mentioned among whom the industry is best organised, and by whom the longest voyages are made in search of sponges. The headquarters of the Greeks are on the little island of Kalimno, which is situated in lat. 37° off the coast of Asia Minor. Outside of the Mediterranean, the only important source of sponges is the shores of the Bahamas, Cuba, and Florida, and the sponges obtained thence are all of inferior quality.

Tallow and stearine, which latter is the harder ingredient in tallow, are most largely imported from the United States, the Australian colonies, and the cattle-rearing countries of South America. The former is used principally in the manufacture of soap, the latter in the making of candles. **Whalebone**, which is taken from the mouth of the Greenland and one or two other whales, is a horny but flexible substance, formerly used as a stiffener for women's corsets, and was formerly imported indirectly from various countries. **Isinglass**, which is the finest form of gelatine, and is largely used in confectionery and in the arts, as well as for clarifying wine and beer, is obtained from the sound or swim-bladder of various kinds of fish, and is imported into this country chiefly from India, Brazil, and China. In Russia it is largely made from the sound of the sturgeon, and in the United States from other species of sturgeon which abound in many American rivers ; but neither of these countries supplies much of this commodity to the United Kingdom. The thicker and less refined kinds of gelatine, including **glue** and **size**, do not enter largely into foreign commerce, but are made in large quantities from native and imported hides and bones by boiling. Even leather which is not made by tanning can be used in the manufacture of glue, but not tanned leather, for the chemical action of the tannin or tannic acid destroys the gelatine.

The most important of the **animal oils** of commerce are the produce of the **whale-** and **seal-fisheries.** Of this oil there are two kinds. One, called **train oil,** is derived from the blubber or coat of fat which invests these animals under the skin. This kind is obtained principally from the **right** or **Greenland whale,** which is hunted in the seas off the west coast of Greenland, on the northern coasts of Norway, and in the Arctic Ocean generally to the north of Norway and Iceland. It was formerly obtained also from the **blubber seals,** which were captured by the northern whale-fishers in many places, but most abundantly off the coast of Labrador and

in the Gulf of St. Lawrence. The seals were soon threatened with extinction, and seal fisheries, now mainly for fur, are strictly controlled. The northern whale fisheries showing signs of exhaustion, Norwegians and others actively prosecuted whale-fisheries in the south Atlantic Ocean, both off the coast of South Africa and South America, especially round the Falkland Islands, and in the Ross Sea of Antarctica, and the southern area is now far more important than the northern. The former Dundee whale- and seal-fisheries and those of Peterhead are extinct, and so also are those of New Bedford, Massachusetts, which died out after the opening up of the Pennsylvanian oil-field. The other kind of fish-oil is that derived from the cachalot, or sperm whale, which contains immense quantities of oil in a cavity in its enormous head and in a tube which runs along its back. The **sperm-whale** being found in almost all parts of the ocean, this kind of oil is imported from many parts of the world. Train oil is used principally in soap-boiling, but sperm oil, a finer and more valuable kind, yields in cold weather a kind of waxy body called **spermaceti,** which, mixed with a little beeswax, is used in the making of candles and by itself in the making of cold cream, salves, &c. A finer kind of train oil than that derived from the right whale is obtained in large quantity from the **bottle-nose whale** (*Hyperoodon rostratus*). Neither the cachalot nor the bottle-nose whale furnishes whalebone, but the former yields besides oil another valuable product, namely the substance called **ambergris,** which is largely used in perfumery, and is sometimes found in the body of the animal, sometimes floating on the surface of the water. It is a result of disease. Of true fish-oils, the most important is **cod-liver oil,** which is largely made in Great Britain, as well as in Newfoundland and Norway from the product of the great cod-fisheries of these countries; halibut-liver oil is also important. A true fish-oil is likewise made from the **menhaden,** a species of Alosa, which is caught in immense quantities off the eastern coast of the United States, from Connecticut to Virginia, above all in the neighbourhood of New York. The oil is chiefly used in leather-dressing, but also in rope-making and painting. Other animal-oils are derived from tallow, lard, bone-fat, &c., and are imported into this country mainly from the United States. From the **dugong,** a kind of oil capable of being used for the same purpose as cod-liver oil, as well as in cooking, has also been extracted in Queensland.

The following are among the animal products which, though of considerable commercial value, either do not enter into the foreign commerce of the British Isles at all, or not to a sufficient amount to be separately enumerated in the trade returns. **Coral** is the name given to the skeleton of a whole group of marine animals; but the red or pink coral, the skeleton of *Corallium rubrum*, is the only one of great value in commerce, its value being due to its use in

the making of trinkets and other ornaments. The coral industry is specially an Italian one, and its chief seat is Torre del Greco, at the base of Mount Vesuvius, in the Bay of Naples. Formerly the chief supplies of coral were obtained by diving in the Bay of Naples, as many as five hundred boats having often set out from Torre del Greco to carry out this fishery. The coral banks both in this bay and in the south of Sardinia, which are also within easy reach of the Torre del Greco fishermen, are being rapidly exhausted, and the fishermen are hence deserting them for those on the coasts of Algeria, Tunis, and Tripoli, which are now more profitable. **Coral** is also obtained on the coast of Catalonia, round the Cape Verde Islands, in the Adriatic, especially on the east coast, and in other places. A considerable quantity of coral was formerly exported directly or indirectly to China, where it was used in the official dress of the mandarins. Coral is of much smaller value than formerly. **Pearls and mother-of-pearl** are derived from various shells, especially of the oyster family, belonging principally to tropical seas. The mother-of-pearl is the internal part of the shell, and pearls are secretions of the same kind of matter round some small parasite or particle of inanimate foreign matter which acts as an irritant. Among the most noted pearl-fishery banks are those in the Persian Gulf, in the Gulf of Manar (Ceylon), in the Sulu Archipelago, in the neighbourhood of the Moluccas and the Aru Islands, in Torres Strait, and in the north-west coast of Australia, at Tahiti, and in the Gulf of California. By providing a suitable irritant inside the shell of the oysters, the Japanese have succeeded in producing 'culture pearls,' practically indistinguishable from those formed without an artificial stimulus. Pearls are also obtained from various river-shells, especially *Unio margaritifera*, which is met with in many European rivers, including some of those of Scotland and the north of Ireland. **Parchment**, the skin of sheep, and **vellum**, that of calf, prepared for writing on, no longer have the value that belonged to them before the invention of paper, but are still manufactured for use in formal documents and in book-binding. The so-called **catgut** consists of the dried and twisted intestines of sheep and other animals. It is used in making the strings of musical instruments, racket-cords, and cords used by clock-makers, polishers, &c. The intestines of larger animals serve to make **gold-beater's skin.** The **nests** of a certain kind of swift (*Collocalia esculenta*), which breeds in caves at various places in the Eastern Archipelago, are looked upon as a luxury in China, where they are imported in millions annually. The nature of the nest has long been a subject of dispute, but the best observers seem to be still agreed that those nests at least which are most valued as food (which are always white) are entirely made from a peculiar saliva secreted by the bird, as was asserted more than a hundred years ago.

The wax of commerce is of both animal and vegetable origin. The greater part of it is still, no doubt, bees' wax, though the commercial supplies of other kinds of wax are still increasing. **Bees' wax** is a product of almost all parts of the world. In Europe, Germany and France are the countries in which bee-keeping is most general, but so large is the consumption of both honey and wax in those countries that the import of both these commodities is considerably greater than the export. Italy, which consumes so much wax in connection with the ceremonies of the Roman Catholic Church, imports from six to ten times as much wax as she exports, but has an excess of exports in the case of honey. Altogether Europe produces much less honey, as well as wax, than is consumed there. The deficiency in **honey**, and part of that in wax, is made up partly by the produce of American bees, this being another case in which Europe is indebted to America for surplus supplies of products originally introduced from Europe, for the honey-bee was not known in the New World before it was introduced by the Spaniards into Mexico. There is now a considerable export from Australia and New Zealand.

The **European supplies of wax** are brought from more various sources than those of honey. Bees' wax is imported into this country more largely from France and the African colonies than any other countries, but there is also a large import of **Japanese and Brazilian waxes**, which are mainly, if not wholly, of vegetable origin. The **Japanese wax** is derived from the seeds of a species of Rhus (*R. succedanea*, Linn.), a tree which also grows in China and India ; the **Brazilian** is found chiefly in the form of a glutinous powder on the leaves of a kind of palm known as the **carnauba**, or wax palm (*Copernicia cerifera*, Mart.). This last kind of wax is too hard and has too high a melting-point to be used by itself in making candles ; and another vegetable substance, known as **myrtle wax**; from a North American shrub (*Myrica cerifera*, Linn.), has too low a melting-point to be so used, but both are mixed with other candle-making materials, and carnauba wax is used in making varnishes and gramophone records. The lofty **wax-palm of the Andes** (*Ceroxylon andicola*, Humb. & Bonfil) has the wax as a coating on the trunk, and various other trees (in Brazil and elsewhere) yield a kind of wax which is locally used for candle-making and other purposes, but is of little importance in commerce ; and others again, such as the *Stillingia sebifera*, Willd., a Chinese tree introduced into both the East and West Indies, yield a kind of vegetable **tallow** which is mixed with wax in candle-making. Of more importance than any of these last-mentioned substances is the so-called **insect white wax** of China, which is one of the most important of all articles of trade within that country, though its high price does not admit of its being exported in any great quantity. This wax is produced in

the south-west of the country, and is formed as a coating on the twigs of one kind of tree, through the action of an insect which is bred upon another kind of tree in a different part of the province, and transferred by carriers to the wax-tree when the insect is at the stage for commencing operations on the latter. The wax is excellent for candle-making.

The **lac** of commerce (often called gum-lac), which is the principal ingredient in sealing-wax, is, like the last-mentioned substance, the result of the action of an insect (*Coccus lacca*, Linn.) on the branches of a tree (in India, the principal source of supply of this commodity, generally the *Butea frondosa*, Roxb., or the *Ficus religiosa*, Linn.). The lac is a kind of resin derived from the sap of the trees to which the insect attaches itself, but modified in its properties by passing through the body of the insect itself. It appears in commerce in various forms and under various names. The twigs encrusted with the substance form the **stick-lac** of commerce. The substance is then freed from the wood and repeatedly washed, after which it appears in the form of grains, forming the **seed-lac** of commerce; and this, being melted, is reconsolidated into thin flakes, which are known in commerce as **shell-lac.** Sometimes it appears in another form, and especially in the case of the coarser qualities used for home consumption. The seed-lac after being melted is allowed to drop into rounded pieces an inch or more in diameter, forming what is called **button-lac.** In the course of the washings above referred to, a red substance originally formed in the body of the insect is separated from the insect, and this, being made into cakes and dried, forms **lake-lac** or **lac-dye.**

ARTIFICIAL SILK. In recent years artificial silk, or rayon (the generic trade name), has been produced in greater quantity than true silk. All types are prepared from some form of cellulose, the usual raw materials being cotton waste or sawdust or wood-pulp. The raw material is reduced to a cellulose jelly by chemical means and then forced through glass tubes of very small bore. It did not assume any real importance until after the War. The following is an estimate of production in recent years :—

	1923.	1930.	1933.	1936.
U.S.A. .	35,400,000 lbs.	112,000,000 lbs.	207,000,000 lbs.	278,000,000 lbs.
England	16,500,000 ,,	49,000,000 ,,	84,000,000 ,,	113,000,000 ,,
Germany	13,000,000 ,,	48,000,000 ,,	66,000,000 ,,	112,000,000 ,,
Italy .	10,000,000 ,,	65,000,000 ,,	82,000,000 ,,	88,000,000 ,,
France .	7,700,000 ,,	40,000,000 ,,	56,000,000 ,,	42,500,000 ,,
Belgium	6,000,000 ,,	10,000,000 ,,	11,000,000 ,,	13,500,000 ,,
Japan .	—	34,000,000 ,,	98,000,000 ,,	285,000,000 ,,
World .	97,000,000 ,,	410,000,000 ,,	665,000,000 ,,	1,019,090,000 ,,

Netherlands, Russia, Canada and Poland are other important producers.

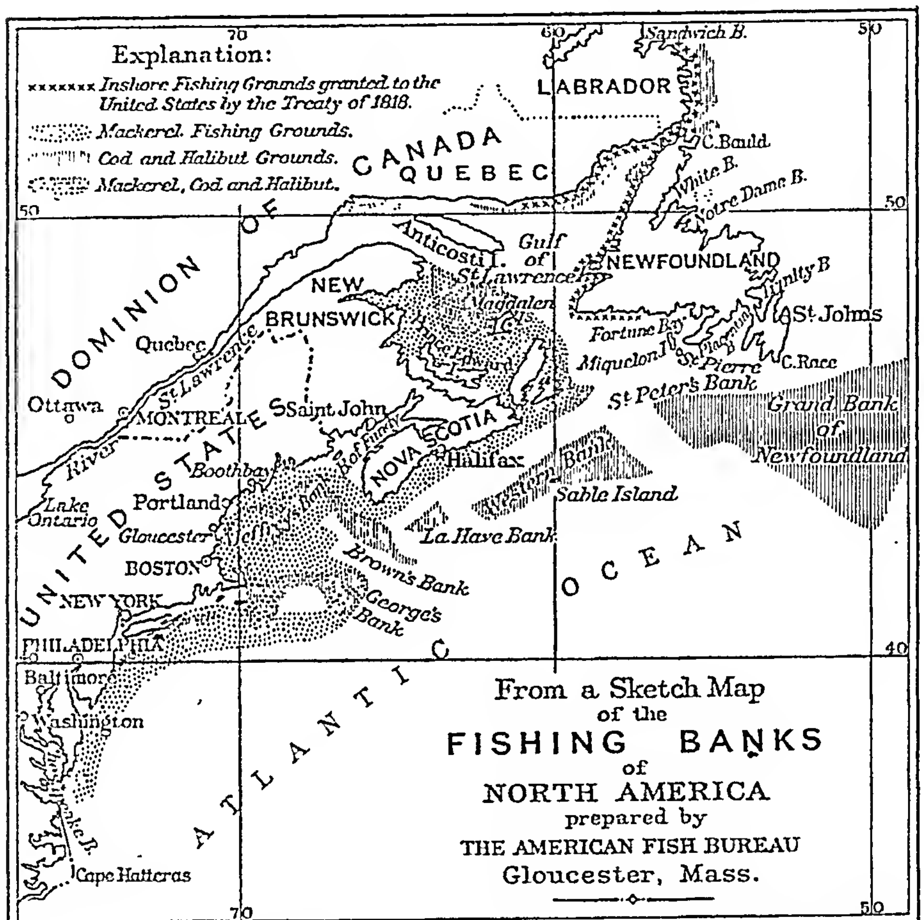
COMMODITIES (*continued*)

II. Fisheries

Under the head of fisheries we include the commercial production not only of all kinds of fish but also of other marine animals used as food. In this sense the fisheries of the United States, Japan, and the United Kingdom appear to be the most valuable in the world. The value of the products of the fisheries in the United States and the United Kingdom about 1900 was above £9,000,000. In the United States, however, the value of the oysters was not far short of one-fourth of the total, while in the United Kingdom the corresponding value was comparatively small. The annual value of the fisheries of Canada increased from less than £3,000,000 in 1880 to upwards of £4,000,000 in 1900; and Newfoundland (including Labrador) added upwards of £1,000,000 annually to the value of the fisheries of British North America. In Europe the fisheries next in importance to those of the United Kingdom are those of Spain, France, and Norway. The output of France includes the produce of the French fisheries on the coasts of Newfoundland and Iceland. In Asia, the most valuable fisheries, so far as statistical data enable us to say, appear to be those of Japan, the produce of which is estimated to exceed in value that of any European country, including the United Kingdom. Taking a typical post-War year, about 1,000,000 tons of fish are landed in Britain and about the same quantity in the United States and in Japan.

The sketch-map on the next page shows what have been long the most valuable fishing-grounds in the world. These consist of a chain of submerged plateaus elevated considerably above the bottom of the surrounding sea, and they very quickly attracted the attention of the early explorers who visited America. This was in the beginning of the sixteenth century, when all Europe was still Roman Catholic and enormous quantities of fish were consumed in the many Church fasts. The discovery of these rich fishing-grounds hence ‘ created the most profound sensation, and kings, noblemen, and wealthy merchants engaged in and fostered the enterprise of fishing with a zeal that we may now find difficult to realise or appreciate.’ The French fishermen were the pioneers in the cod-fisheries, and it is said to be fairly certain that as early as 1504 the

Normans and Biscayans knew of the Newfoundland fisheries. It is probable indeed that these fishing-grounds were known by the Norwegians many centuries before Columbus 'discovered' America. At the present day the coast-line bordering the seas in which these fishing-grounds lie belongs to Newfoundland (including Labrador), the Canadian Dominion (provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Quebec), the



George Philip & Son, Ltd

United States, and two small French islands of St. Pierre and Miquelon. The fisheries on the banks in the open sea are free to all, but the rights of 'inshore' fishing are limited by treaty. The treaty at present regulating the rights of United States fishermen in British waters and those of Canadian and Newfoundland fishermen in United States waters is the Treaty of London of 1818, as interpreted by the Arbitration Tribunal at the Hague in 1910, according to which the waters within three miles of the coast are reserved for the fishermen of the country to which the coast belongs, except along the coasts indicated by crosses on the accompanying

sketch-map. French fishermen are allowed to fish on all the coasts of Newfoundland from Cape St. John (lat. 50° N.) on the east coast round the northern peninsula of the island, and as far as Cape Ray at the southern end of the west coast. The other rights enjoyed by the French under the Treaty of Utrecht were renounced under a convention concluded in 1904.

Although they have been eclipsed by the Pacific coast fisheries (including Alaska) those of the New England States, notably Massachusetts and Maine, are still very important. The principal fish caught are cod, mackerel, hake, herring, and tile-fish (*Lopholatilus chamæleonticeps*). The last mentioned, which attains a length of over 3 feet, was first caught in 1879, shortly afterwards was destroyed in immense numbers apparently through the warm Gulf Stream waters on the so-called Gulf Stream Slope giving place to cold water issuing from the Gulf of St. Lawrence, but has again been caught to the amount of millions of pounds annually since about 1915. Two species of *Alosa* are likewise caught in large numbers. One of these is the menhaden ; the other is known as the alewife, and is caught most abundantly in the waters of North Carolina. It somewhat resembles the shad, and is used as food.

On the Pacific Coast the great speciality of the fishing industry is the catching of salmon for export in tins (salmon-canning). It is chiefly pursued on the Columbia River (Oregon), the Sacramento (California), on the Fraser, Skeena, and Naas Rivers, besides several inlets in British Columbia, and in recent years above all in the rivers and creeks of Alaska. Canned salmon represents more than half the value of the total output of canned fish. Next to the salmon fisheries those of cod and halibut are the most important on this coast.

The chief products of the lake fisheries are whitefish, trout, 'herring,' and sturgeon ; the whitefish and herring being both species of *Coregonus*. The fish of the Great Lakes were ruthlessly exploited, even being used as manure, with the result that certain types were almost exterminated and the fisheries are now relatively unimportant. The oyster-fisheries of the United States are of very great value. They are chiefly carried on in Chesapeake Bay, Maryland and Virginia being the states most largely concerned in the industry, and Baltimore the centre of the trade.

The Canadian fisheries yield principally salmon, cod, lobsters, herring, and mackerel. The salmon is mainly produced in British Columbia and in the rivers of eastern Canada. Nova Scotia and New Brunswick are important provinces in this industry. Great care is now taken to preserve the industry and billions of fish are hatched annually and later liberated into the rivers. In Newfoundland the production of cod is far in excess of that of any other fish.

The fisheries of the United Kingdom employ above 80,000 men, who land annually at British ports about 1,000,000 tons of fish. It is estimated that the industry gives actual employment to about double the number actually fishing, supporting in all about half a million of the population. A large proportion of the fish caught, however, are obtained from distant waters extending from the Barents Sea, north of Lapland, and the White Sea to the north-west of Morocco. The fisheries are pursued chiefly from ports in Great Britain. Not only is the value of the fish caught in Irish waters relatively small, but a large proportion of the catch is made by English, Scotch, and foreign fishermen. The principal reasons for this state of things are these. The waters of the North Sea are much richer in food-fishes than the other waters of the British Isles. It is in consequence of this that the five leading fishing ports, Grimsby, Aberdeen, Hull, Yarmouth, and Lowestoft, the only ones (except Fleetwood) at which more than 50,000 tons a year are landed, are all on the east coast. Further, the principal Irish fishing banks are off stormy parts of an iron-bound coast in the north-west and south-west ; the Irish fishermen are mainly peasants, who make use of small boats fitted only to take advantage of brief spells of fair weather ; the chief markets for fresh fish are in Great Britain, and accordingly not accessible by railway ; the Irish railways do not extend to certain places where fish might otherwise be advantageously landed ; and, finally, there are in Ireland no proper fish-curing establishments.

The English fisheries are more miscellaneous than those of Scotch waters, herrings and mackerel among those caught near the surface, and soles, haddocks, cod, and turbot among the demersal or bottom-frequenting fish, all having a high place in the list of products of the fisheries of England, whereas in those of Scotland the herring-fisheries are without a rival, those of haddock and cod coming next. Pilchards, which are the mature form of the true sardine, are a speciality of the Cornish coasts where they were once abundant but are now scarce. Besides the fishing ports above mentioned Fleetwood, Milford, and North Shields are important in England and Wales, and in Scotland Wick, Lerwick, Fraserburgh, Peterhead, Stornoway and Leith. Aberdeen is the greatest trawling centre north of the Humber. The great market is Billingsgate in London. Oysters are largely produced at Whitstable on the north coast of Kent and at Colchester on the Essex coast. The salmon fishing of Scotch, Irish, and some English rivers is largely ‘ preserved ’ for sport and is a source of considerable wealth.

The principal Norwegian fisheries are those of cod and herring, the cod-fisheries being carried on chiefly on shallow banks round the Lofoten Isles, the herring-fisheries mainly in the neighbourhood of Bergen. Fish-canning, especially of bristling, is important.

In the fisheries of France, sardines and anchovies, and also oysters, are of special importance. The sardine and anchovy fisheries are carried on mainly on the Mediterranean coasts, the sardines of Provence being esteemed the best. The great market for the Provence fisheries is Beaucaire on the Rhone, east of Nîmes. On the Atlantic side the great seats of sardine-packing are Bordeaux and Le Mans. Sardines and anchovies are likewise caught and prepared for export on the coasts of Spain, Portugal, and Italy; but it must be mentioned that a kind of sprat is often prepared like the sardine and sold under that name. Oysters are produced mainly on the coasts of Brittany and other parts of the Atlantic coast farther south. Since about 1856 artificial oyster-breeding has been pursued in France with great success, chiefly in the basin of Arcachon (to the south of the Gironde), and in the bay of Morbihan (on the south coast of Brittany).

Besides the sardine and anchovy the only important food-fish of the Mediterranean waters is the tunny. This fish (*Scomber thynnus*) is a gigantic congener of the mackerel (*Scomber scomber*). It attains a length of as much as twelve or thirteen feet, and a weight of 1,000 to 1,200 lbs., and it appears in immense shoals in the beginning of summer, especially on the coasts of Sicily, Sardinia, and southern France. The fishery is carried on chiefly on the coasts of Sicily and Sardinia, which are visited by thousands of native and foreign fishermen during the fishing season.

In Russia the river fisheries and those of the Caspian Sea are of great value in consequence of the abundance of the sturgeon in these waters. Caviare, or the roe of the sturgeon prepared as a delicacy, is by far the most important fishery product exported from that country.

Of the fisheries in Asiatic and Australian waters the only ones that need be mentioned are the fisheries of Japan, and those for trepang in tropical seas. Sardines, herrings, and bonitos, the last a large fish of the same genus as the tunny, are the principal products of the Japanese fisheries, but the waters surrounding the island of Yezo in the north of Japan abound also in salmon, cod, and other food-fishes, the catching of which forms the principal industry of the inhabitants. Trepang, also known in commerce by the French name of *bêche-de-mer*, is a kind of sea-cucumber, which is a favourite article of food with the Chinese, and is extensively fished for the Chinese market on all the coasts of the Eastern Archipelago, on those of New Guinea and northern Australia, and round many of the tropical islands of the Pacific. It is likewise exported from China to distant countries in which Chinese are settled (California, &c.).

The foreign commerce in fish is by no means proportioned to the productiveness of the fisheries, most kinds of fish being produced mainly for markets near at hand. The fish exports of the British

Isles are chiefly herrings to the Baltic, above all Germany and Russia, and cod (salted or dried). Nearly five-sixths of the herrings landed at British ports in 1913 were exported; hence the serious loss of markets through the War. In recent years about 40 per cent. of the whole catch of fish has been exported. Latterly, imports of canned fish, especially salmon, have increased enormously. The value of the export from the United States is equal to perhaps one-sixth of the total production, by far the largest item being **canned salmon,** which is sent largely to the United Kingdom and Australia. The same is true of the large export of canned salmon from Canada. Dried and **cured cod** and other fish come next in importance, these being sent mainly to the West Indies, South America, and Germany. About 60 per cent. of the produce of the Canadian fisheries is exported, chiefly to the United States. Newfoundland and Norway are the two countries which export the greater part of the produce of their fisheries. From Norway are exported both herrings and dried and cured codfish. The herrings are sent chiefly to the Baltic, but the great markets for the latter are the same as those for the dried and cured codfish which make up the bulk of the export from Newfoundland, namely Spain, Portugal, and Italy, Roman Catholic countries in which there is still a very large consumption of fish. St. John's in Newfoundland and Bergen in Norway are the centres of this trade. Bergen has the advantage over St. John's of being about 360 nautical miles nearer the Straits of Gibraltar; but, on the other hand, it is at a greater distance from the chief fishing-ground. A small quantity of dried codfish is also exported from Nova Scotia to the same markets, but Halifax in Nova Scotia is under the disadvantage, in respect of this trade, of being about 500 nautical miles farther than St. John's from the seaports of southern Europe.

The deep-sea fisheries of Germany grew rapidly after the last decade of last century, largely in consequence of state encouragement in the provision of fishery harbours, such as those of Geestemunde, Norderney, and Altona, in the freeing of fishing-boats from harbour and pilotage dues, and in other ways.

Several experiments have been made with the carriage of refrigerated fish, but the trade has not yet been developed to the same extent relatively as with meat. English fish is now generally obtainable from 'cold storage' depôts in the larger cities of the tropics. Rhodesia is now regularly supplied with fresh fish sent frozen in small blocks of ice from Cape Town.

III. Mineral Products

COAL. Coal consists of vegetable matter which has been buried and sealed up out of contact with the air in past ages, and has then undergone a series of chemical changes, the general result of which is to get rid of a large proportion of hydrogen and oxygen and to increase the relative proportion of carbon in the remaining substance. In pure woody fibre the proportion of carbon present is little more than half, whereas in ordinary **bituminous coal** it may amount to from 85 to upwards of 88 per cent. The substance known as **lignite,** or brown coal, consists of vegetable matter much less altered than in ordinary coal, and contains a smaller relative amount of carbon, say 70 per cent. In certain situations, the process of removing hydrogen and oxygen has gone further than in the formation of bituminous coal, and as much as 94 per cent. of carbon may be present. There is then formed a kind of coal called **anthracite,** which is lustrous on the surface, does not soil the fingers, is difficult to light, burns with little or no flame, but produces an intense heat when it does burn. **Coke,** an artificial product made by heating bituminous coal in closed vessels or ovens, and removing the more volatile constituents, contains as high a proportion of carbon as anthracite, but the product acquires in the process a highly porous or vesicular structure along with hardness and density. It is these properties that make it so valuable in the blast-furnace, its hardness enabling it to resist crushing by pressure, and its porosity presenting a greater amount of surface to the action of heated air. The removal of the more volatile constituents is sometimes effected directly by burning, either in what are called beehive ovens, but now more and more in a kind of retort which allows of the gases being deprived of tar, benzene, ammonia, and other valuable by-products. The beehive ovens produce a coke in some respects better in quality, but besides involving the loss of the by-products consume more coal in producing the coke, and the balance of advantages is thus proving in favour of the retort ovens, which have for some time been those chiefly used on the mainland of Europe. According to the British census of production (1907) there were in that year

nearly 27,000 coke-ovens not yielding by-products against 5,200 of other types. In 1924 there was less than half the number of ovens in use, but 75 per cent. of them were by-product ovens. The quantity of coal required on the average to produce a ton of coke in the United Kingdom in the year 1907 was 1·64 tons, in 1924 the quantity had dropped to 1·48 tons, while in Germany in 1910 the corresponding quantity in the coke-ovens supplied by the Westphalian Coal Syndicate was only about 1·28 tons. Only certain kinds of coal are suitable for the making of coke, the best being those which fuse readily into a mass in burning.

Coal was little known even in England a thousand years ago. It is indeed certain that it was worked at several places in Roman Britain, but it seems to have been little used in Anglo-Saxon times. The first proper coal-mines are, however, said to have been opened almost at the close of that century (1198) in Belgium, and it is long before we hear of a trade in Newcastle coal. In 1615 that trade had nevertheless attained considerable magnitude. It is then said to have employed four hundred vessels in distributing coal over England, about half of that number being engaged in supplying London alone. In 1660 the total coal production of England is estimated at less than two and a quarter million tons, which, according to the estimate formed of the population of England and Wales at that time (about 5,500,000), is equal to about two-fifths of a ton per head.

The vast increase in the use of coal in recent years has been due chiefly to the requirements of modern factories, of railways and steamers, of blast-furnaces, gasworks, and electrical installations. At the beginning of the nineteenth century, after the invention of the steam-engine and its application to spinning machinery, but before the invention of steamboats, and still longer before the introduction of railways, and before coal gas came into general use for lighting, the production of coal in England is estimated to have been ten million tons, equal to about five-eighths of a ton per head for the estimated population of the United Kingdom. The differences under these heads at the end of the nineteenth century are shown in the accompanying diagrams, which afford a comparison with the two other leading coal-producing countries of the world, and the tables on pp. 243–44 extend this comparison.

The Royal Commission on the Coal Industry (1925) gave as approximately correct figures showing the total consumption of coal in the United Kingdom in 1924,[1] and these have made it possible to draw up the table on p. 244 in percentages, which it is interesting to compare with more or less corresponding figures for Germany in 1913 (taken from or based on those given in W. A. Bone's *Coal and*

[1] Report of the Royal Commission on the Coal Industry [Cd. 2600], 1926, p. 11.

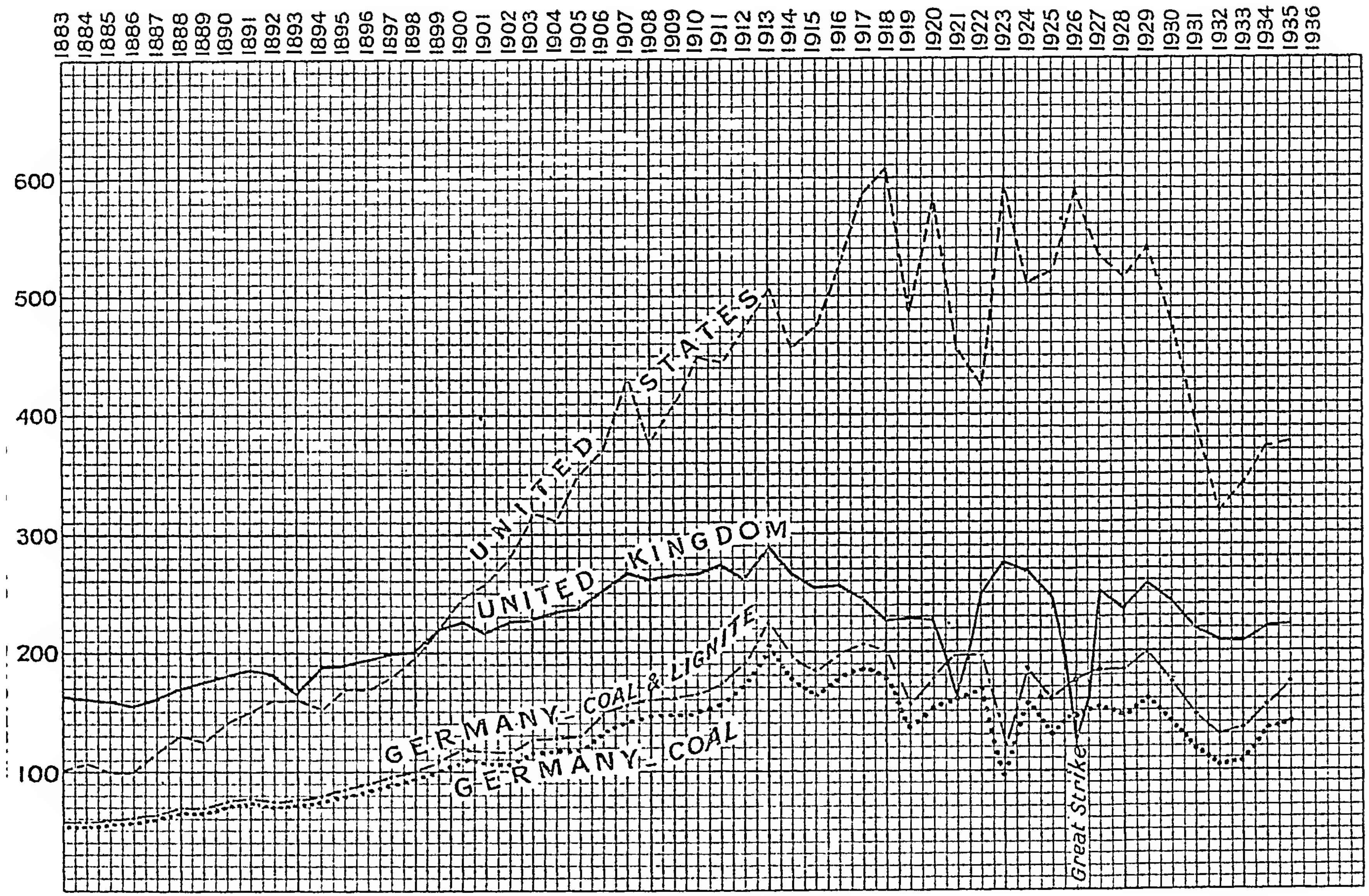


DIAGRAM I.

COAL PRODUCTION SINCE 1883.

In drawing the line for coal and lignite (Germany) the lignite has been estimated in accordance with German practice in the ratio of 9 : 2 coal. Germany from 1922 includes the Saar Basin.

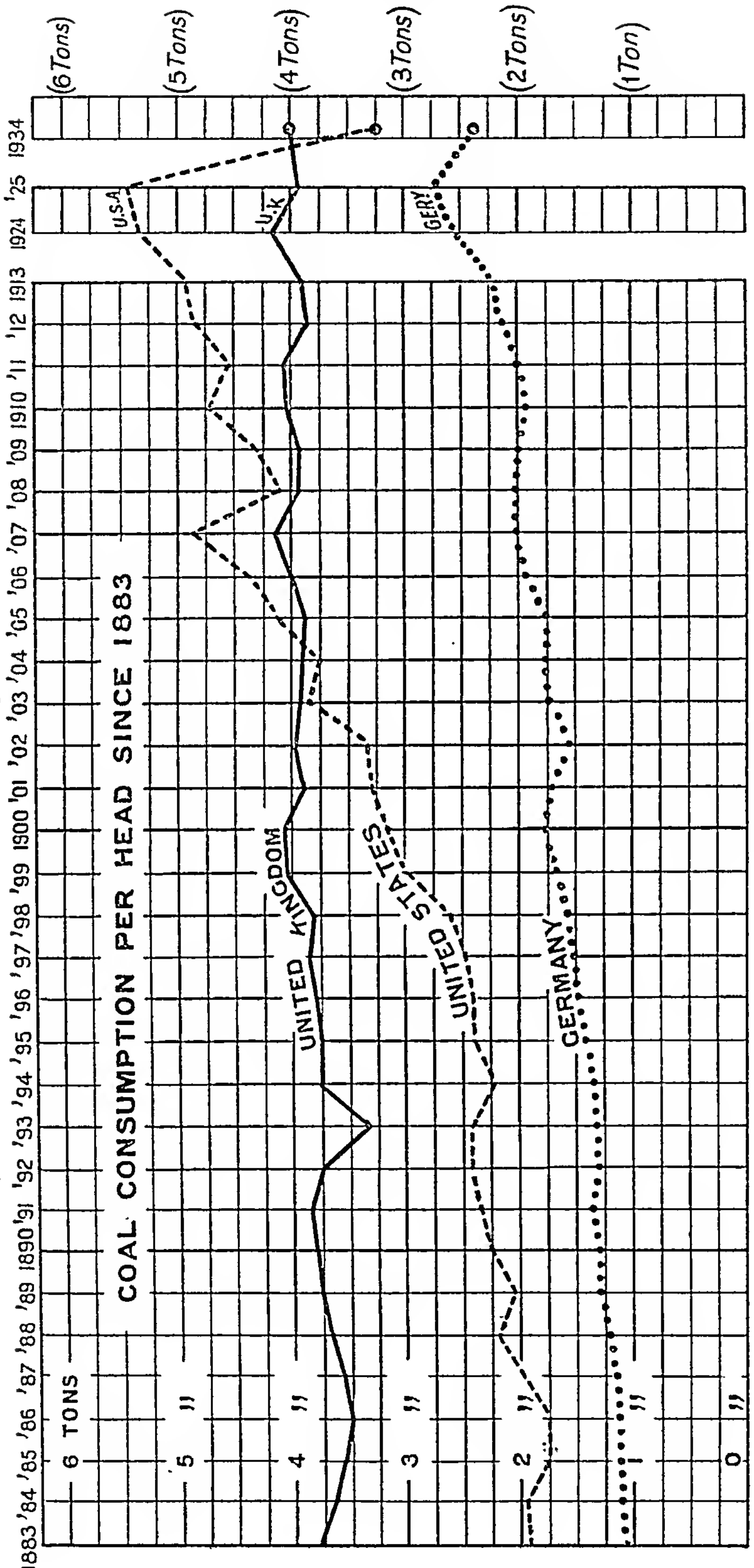

COAL CONSUMPTION PER HEAD SINCE 1883
UNITED KINGDOM
UNITED STATES
GERMANY
U.S.A.
U.K.
GER.Y
6 TONS
5 "
4 "
3 "
2 "
1 "
0 "
(6 Tons)
(5 Tons)
(4 Tons)
(3 Tons)
(2 Tons)
(1 Ton)
1883 '84 '85 '86 '87 '88 '89 1890 '91 '92 '93 '94 '95 '96 '97 '98 '99 1900 '01 '02 '03 '04 '05 '06 '07 '08 '09 1910 '11 '12 1913 1924 '25 1934

DIAGRAM II.

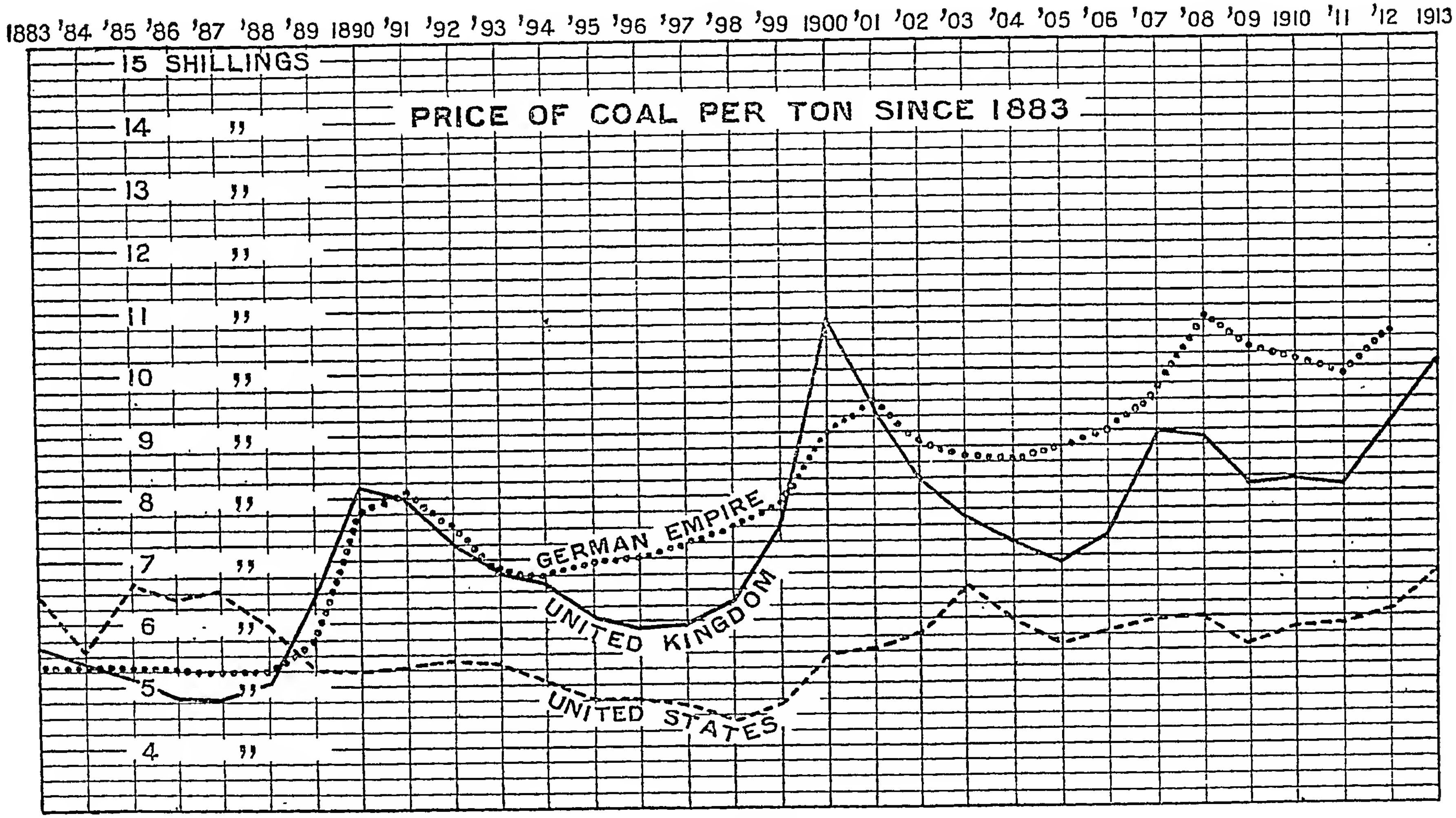


DIAGRAM III.

During the War coal prices fluctuated enormously. In the United States f.o.b. mine prices ranged from $1.24 per long ton (average of 1914) to $3.75 (average of 1920). In 1924 the average price of coal per ton was 18*s.* 10*d.* in Great Britain (pit-head price); 20*s.* 1*d.* in Germany (average value of Rhenish Westphalian output), and 11*s.* 1*d.* in the United States. (Figures from Report of the Royal Commission on the Coal Industry, 1925.)

its Scientific Uses, pp. 478, 479) and the United States in 1923.[1] The particulars have been so arranged as to make the data as nearly as possible comparable with one another.

Country.	Estimated Reserves.[1] Thousand Millions of Tons (Anthracite and Bituminous Coal only).	Average Annual Production in Millions of Tons.[2]				
		1881–85.	1896–1900.	1906–10.	1930.	1935.
United Kingdom	190	158·9	209·0	261·7	247·7	226·5
Australia	133	2·5	5·4	9·3	9·4	9·8
Canada	286	1·6	4·0	9·7	10·3	12·6
India	76	1·2	4·8	11·5	22·9	21·2
New Zealand	1	0·4	0·9	1·9	2·5	2·1
Union of South Africa	56	—	—	5·2	11·9	13·1
Austria-Hungary	40	7·7	11·8	14·8	—	—
Czechoslovakia	28	—	—	—	14·4	11·0
Poland	80	—	—	—	37·5	28·7
Netherlands	—	—	—	—	12·2	12·0
Belgium	11	17·3	21·7	23·3	27·4	26·5
China	250	—	—	—	20·0	27·2
France	16	19·4	30·7	35·6	55·0	46·2
Germany	350	53·6	95·2	142·6	142·7	143·0
Japan	7	1·1	6·2	14·3	28·9	33·1
U.S.S.R.	1,080	3·8	12·4	24·6	47·2	103·8
Spain	8	1·0	2·3	3·6	6·5	5·9
United States	1,975	95·5	202·8	405·9	487·1	378·9

[1] From the preface to the *Coal Resources of the World*, a report presented to the Twelfth International Geological Congress, Toronto, 1913, revised in 1933 for China, Russia, Germany, Poland, and Czechoslovakia.

[2] The coal production of the world decreased from 1,320 million tons in 1913 to 1,152 in 1919; that of the United Kingdom from 287 to 233 million tons, while that of the United States increased from 509 million tons in 1913 to 611 millions in 1918, though in consequence of a strike it decreased in 1919 to 486 millions. In 1930 the world production was estimated at 1,194 million tons, in 1935 only 1,072 million tons, but with increasing world prosperity 1,500 million tons may be regarded as normal.

So far as these figures correspond with one another the most striking differences are under the heads of export, railways, and bunker coal, and are significant of geographical differences between the three countries. The British export of coal had long been expanding before the War at a more rapid rate than the production, and in 1913 the coal[2] exported from the United Kingdom was 26·7 per cent. of the total production in that year. This heading is one indication of the same geographical advantage as is revealed also by the high proportion of bunker coal used in the United Kingdom, while the high proportion of coal used on the railways,

[1] The Mineral Industry, 1925, p. 149 (Bituminous coals only).
[2] Inclusive of coke, cinders, and patent fuel.

especially in the United States, is equally significant of the enormous land area and internal land trade in that country.

United Kingdom (1924).		Germany.		United States (1923).	
Domestic . .	12·8	Domestic . .	9·1	Domestic . .	12·8
Pig-Iron manufacture . .	5·4	Briquetting plants	3·5	Coke ovens .	15·6
Electric power production . .	3·0	Coke ovens .	23·4	Iron and Steel works	5·6
Factories . .	26·8	Public purposes	2·9	Electric power production . .	6·8
		Industrial . .	10·0	Factories (General industrial) .	21·5
		Factories . .	14·1		
Miners' Coal .	3·7	Agriculture .	4·0	Agriculture .	—
Coal Mines .	6·3	Mines . .	—	Mines . .	2·4
Railways . .	5·0	Railways . .	9·3	Railways . .	28·8
Bunker Coal, external trade .	6·7	Navigation .	5·3	Bunker coal, external trade .	1·0
Do., coasting trade	0·5			Do., coasting trade	0·6
Gas . . .	6·4	Gas . . .	5·3	Gas . . .	1·0
Export . .	24·6	Export . .	13·1	Export . .	3·9

An admirable summary of the post-War condition of the Coal Industry, with special reference, of course, to Great Britain, is given in the Report of the Royal Commission on the Coal Industry (1925). The year 1913 marked the climax of the prosperity of the coal-mining industry in Great Britain. For the five years of the War the industry was under Government control; export prices rose to such heights that much of the export trade was lost and foreign fields stimulated into active development. In 1920 the output had fallen to 230,000,000 tons and exports to 19 per cent. of the output. A gradual recovery followed, only to be succeeded by the disastrous year 1926 when, owing to labour troubles, production fell to 125,539,300 tons and exports to 20,596,571 tons. The 'normal' production may be regarded as about 250,000,000 tons (about one-sixth of the world's total) and exports 50,000,000 tons. The coal export trade is a vital one to Great Britain. Coal forms only about one-tenth of the total exports in value, but fourth-fifths in volume. In the words of the report 'By furnishing outward cargo for a large amount of shipping it cheapens freights for the imports on which we depend for our vital needs.'

There have been many speculations as to the future of the coal supply of the world as a whole and of particular countries. The vast extent and content of the known coal-fields of the world as shown in the first column of figures of the table given on p. 243 removes, indeed, any fear of the using up of the coal-supply of the world to the remote future. With regard to the coal-supply

of any particular country [1] or region, however, it must be borne in mind that so far as the prosperity of such country or region depends on cheap coal, that prosperity will be more or less affected as soon as the price of coal begins to rise relatively to other countries or regions. As to the future of the coal production where large deposits of coal still remain to be utilised, it is impossible to prophesy; the conditions which determine whether a coalfield is worked or not are too numerous and uncertain. Much depends upon the quality of the coal, the situation of the coalfield, the ease with which the region can be supplied with coal from elsewhere, or with power from other sources, and much also on the habits of the people. As falling water is now so important a competing source of power, it should be mentioned here that where there is plant for the continuous development of power by this means one British horse-power hour=500 foot-pounds=746 watts, is equivalent to the consumption of 2 lbs. of coal. With continuous working, therefore, on 300 days in the year, a horse-power year would be equivalent to the consumption of nearly 6 tons in that time. Thus Canada's developed water-power resources represent a saving of coal of 45,000,000 tons per annum.

With respect to the immediate future, the diagrams on pp. 240–241 afford the means of forming a reasonable anticipation in so far as they indicate the tendencies of recent years. Our first diagram shows that both our two chief rivals in manufactures are rich in at least one of the great sources of power, and that in both countries the production of that source of power has been increasing more rapidly than at home, and the second diagram shows that the consumption of our rivals is increasing at a relatively even more rapid rate. The most noteworthy tendency since the War has been the decreasing share of the three great producers (the United States, Britain, and Germany) which formerly mined two-thirds of the world's coal in the total output. The world's total shows a slight, but definite, tendency to rise, despite the competition of oil and water-power.

The chief geographical considerations in connection with coal, apart from its distribution locally and the accessibility of the seams,

[1] The second Royal Commission on the Coal Supplies of the United Kingdom estimated the total quantity of available coal in the United Kingdom in seams of 1 foot in thickness and upwards, down to a depth of 4,000 feet, as follows:

	Millions of Tons.
Above 4,000 feet below the surface in proved coalfields .	. 100,915
„ „ „ „ in unproved coalfields	. 39,483
	140,398

Later estimates, on the same basis, by Sir Aubrey Strahan (1912) gave 178,727 millions of tons; whilst Professor H. S. Jevons in 1915 gave an estimate of 197,000 million tons.

arise from the cost of carriage and the consequent economic motive of avoiding carriage wherever and so far as possible. When coal is made dear by difficulties of transport, there is every inducement to make the best provision practicable to secure its efficiency where it cannot be dispensed with, to develop the most economic prime movers. Thus it came about that in Switzerland the most efficient steam engine was developed and used much earlier than in Great Britain. In other cases coal may be replaced by some locally cheaper even if less efficient fuel or by use of water-power. But, as we have already seen, even where coal is the source of the power used, its carriage may be largely avoided by the electrical transmission of the power, and the higher transport costs become the greater is the inducement to resort to this method of utilising fuel. This has been well illustrated in the last few years in Britain in connection with the development of the electricity 'Grid.' Most of the primary generators are either on the coalfields, *i.e.* the electricity is pit-head carbo-electricity, or are situated where they can receive bulk supplies of coal direct by water.

Lignite, as the name indicates, is a woody kind of coal, sometimes of a brown colour, and hence known as brown coal in Germany. It is largely produced in Germany, Czechoslovakia, Austria, Australia, and Canada, as well as in the United States. In Germany its value per ton is little more than a fourth of that of true coal, which limits its range of transport. According to German practice 11 tons of lignite are considered equivalent to 2 tons of coal. There is obviously a great advantage in using lignite where mined to generate electricity. Thus Melbourne, Australia, is supplied with electricity from the Morwell lignite deposits. The immense superficial deposits of **peat** in Ireland, Scotland, Germany, and elsewhere, are still for the most part of even more restricted utility. Experiments with Irish air-dried peat showed that on the average the heating power of coal was as 1 : 1·77 by weight and 1·5 by volume of peat. Nevertheless peat is beginning to acquire increased importance in some places in connection with electricity. In Germany, Professors Frank and Caro succeeded in adapting the Mond gas-producer to the use of peat for the production of electric power with commercial success, tar and sulphate of ammonia being obtained as by-products. As the yield of the sulphate is likely to be an important factor in the profitableness of such an undertaking, the richness of the peat in nitrogen, which varies considerably, will affect to a large extent the availability of different deposits for this purpose.

PETROLEUM AND ITS PRODUCTS, with other allied substances. Petroleum, which means rock-oil, is a general name given to oils which flow freely or are pumped from holes bored in the earth. From the crude oil as it issues from the earth numerous products having a great variety of uses are made by distillation and

other processes, these products differing from one another in weight and fluidity, as well as in other properties. The names given to these products are variously used in different places, which is the source of a good deal of confusion. The name of kerosene is now very generally given to a light kind of oil which is that most abundantly produced for use in lamps. Heavier kinds of oil, to which various names are given, are better adapted for heating purposes, and heavier oils still are very abundantly produced for use as lubricators for machinery. These heavy oils are what are generally known in the United States as paraffin oils, but in England this name had previously been given to an oil prepared from a different material for lighting, and hence in this country the light petroleum of the Americans is frequently sold as paraffin oil. But the development of the internal combustion engine has made gasoline or petrol the product of petroleum which is now of the greatest importance. In the process of distillation it is the lightest fraction and the first to come off. Crude oils vary in their richness in petrol ; when a crude oil yields large quantities it is almost certain to be refined to yield a maximum of petrol. Indeed the yield is now commonly increased by the process known as 'cracking' whereby the heavier fractions are split chemically into petrol and still heavier oils. Only in those cases where the crude oil is poor in petrol is it likely that it will be used direct as fuel for steamships, a large proportion of which—both liners and battleships—now burn oil in place of coal. The development of the Diesel engine has given a use to oils heavier than petrol, whilst the world-wide increase in the use of electricity has resulted in a decreased demand for kerosene and other lighting oils. On the other hand, the cheap mineral oils have replaced vegetable and animal oils for lighting purposes in all parts of the world. Similarly as lubricants the derivatives of mineral oil have replaced vegetable and animal oils (except in special cases, such as castor oil as a lubricant for aircraft bearings) since they are less likely to become gummy and adhesive.

Amongst the end products from the distillation of mineral oil may be noted bitumen or asphalt (for roadmaking and similar purposes) and paraffin wax (used in candle-making). Vaseline, medicinal paraffin oil (a gentle aperient), and batching oils, that is oils used in the softening of flax and other tough fibres, are also obtained from certain oils.

Similar products can be obtained by the destructive distillation of oil shales. The shale-oil industry has long been established in the midland valley of Scotland, but of recent years has suffered from the exhaustion of the richer shales (which yielded as much as 80 gallons per ton of shale) and the competition of the more cheaply produced crude oils. There are vast deposits of oil shale in many parts of the world which will be worked when a rise in crude oil prices or the

invention of more efficient retorting processes renders their exploitation economically possible. Low-grade coals may also be used, and indeed coals of all types. Those countries, such as Britain, which are rich in coal but poor in mineral oil are turning their attention to the production of oil from coal. There are two chief processes whereby this can be effected. One is low temperature carbonisation whereby the coal is converted into a valuable smokeless fuel (coalite) and oil which can be refined as required. The other is the hydrogenation process whereby coal is combined with hydrogen at high temperature and under high pressures thus converting the whole into crude oil from which a large yield of petrol can be obtained. The plant is expensive but large works have been established in England at Billingham-on-Tees, by Imperial Chemical Industries, Limited.

The petroleum industry on a great scale is entirely of modern, and indeed of comparatively recent, origin, and has attained its present dimensions in consequence of the abundance of the supplies that have been discovered in certain regions, the great utility of its products, the ease with which it can be extracted from the earth and transmitted long distances in pipes, and the consequent cheapness of its products. The existence of petroleum was known even to the ancients, being mentioned by Herodotus, Plutarch, and Pliny; but the great development of the industry has taken place since the great oilfields of Russia (Trans-Caucasia) and the United States began to be worked.

The amazingly rapid increase in the world's production of petroleum will be apparent from the table given below. Although the rate of increase has diminished in recent years this is mainly due to a restriction of output. The rapid rise from about 1910 or 1912 to 1923 was largely due to a succession of new fields being discovered in the United States, where the production increased from 35,500,000 tons in 1913 to 97,700,000 in 1923. It is generally true to say that the huge output is maintained or increased by the continued discovery of new fields. This cannot continue indefinitely and it is safe to say that the world's crude oil supplies will be exhausted long before those of coal.

World's Production of Crude Oil.

	Million Barrels.		Million Barrels.
1903	195	1929	1,489
1913	366	1930	1,410
1918	502	1931	1,360
1923	1,019	1932	1,290
1926	1,098	1933	1,385
1927	1,261	1934	1,459
1928	1,325	1935	1,572

In most petroleum statistics 7 barrels are reckoned as equivalent to one ton, and each barrel is equal to 42 imperial gallons.

The present distribution of the world's petroleum output is given in the following table :—

	Thousands of Barrels. 1927.	1935.		Thousands of Barrels. 1927.	1935.
United States .	901,130	953,905	Argentina .	8,630	14,700
Mexico . .	64,200	40,235	Poland . .	5,340	3,605
Russia . .	77,020	167,090	Trinidad . .	5,710	11,300
Iran (Persia) .	39,690	48,470	Sarawak . .	4,940	5,000
Dutch East Indies	25,970	43,000	Japan . .	1,790	1,870
Venezuela .	63,130	148,360	Egypt . .	1,270	1,547
Roumania .	26,100	58,690	Colombia .	15,000	18,000
Peru . .	10,135	16,847	Other Countries	3,230	81,723
British India .	7,880	9,000			

It is a matter of the greatest difficulty to give a general account of the oilfields of the world, since development is so rapid that any account must be out-of-date almost as soon as it is written and before it is printed. Two fields—Santa Fé and Long Beach—which produced 25 per cent. of the United States total in 1923 were virtually unknown two years previously, and three years later had dropped to the position of secondary producers.

United States. In the United States the productive oilfields lie in groups in several areas. The first extensive development took place in the eastern states, where a great oil region about 160 miles in length, and 40 miles broad in the middle, stretches from south-west to north-east through the western parts of the States of Pennsylvania and New York. Oil was observed on the surface of the ground within this region as far back as 1819, but the first company for utilising the oil was formed in 1853, and at first the only method of collecting the oil was by spreading cloths over the ground to soak it up. Oil was first reached by boring in 1859, and it is since then that the oil industry of the United States has sprung up. There are now thousands of miles of pipes, through which oil from the individual wells or groups of wells is run into great central refineries. What are called Pipe Line Certificates are issued to the proprietors of the wells in proportion to the amount of crude oil which they run into the pipes for refining.

In 1885 nineteen-twentieths of the United States crude oil came from the Pennsylvanian fields. Since then the proportion has steadily diminished as production in other fields has increased.

Another group of fields lies to the south of the Great Lakes, in the States of Illinois, Indiana, and Ohio, where the Lima Oil Field is one of the best known.

The Mid-Continent Fields lie in the States of Kansas and Oklahoma. Among them are many remarkable for the enormous production attained within a few months of their discovery. The more important of the fields include Spindle Top.

The Gulf Coast Fields, as the name implies, lie near the coast of the Gulf of Mexico in the State of Texas.

Even more remarkable have been the oilfields of the southern part of the State of California. The fields are centred round Los Angeles and are largely the cause of the rapid rise of that town. California became the foremost producing state of America and the exploitation of its oil resources has been characterised by the remarkable series of 'giant producers,' brought in one after another, but nearly all the fields show signs of a rapidly decreasing output, so that Texas and Oklahoma are now larger producers.

The following table gives the production of the United States by States in 1934 :—

	Million Barrels.		Million Barrels.
Arkansas	11·5	New Mexico	17·4
California	187·5	New York	3·8
Colorado	2·3	Ohio	4·3
Illinois	3·8	Oklahoma	190·6
Indiana	1·0	Pennsylvania	14·8
Kansas	47·2	Texas	392·8
Kentucky	5·0	West Virginia	4·2
Louisiana	33·3	Wyoming	14·0
Montana	3·8		

A large proportion of the refined oil produced in the United States is exported, and the markets are scattered all over the world as is only natural in the case of a commodity having such important uses. Despite the enormous increase in output, the demand for many years kept up with the supply and there is even an import, largely owing to the expansion of motor transport and the conversion of many steamships to burn oil-fuel instead of coal.

Mexico for long occupied second place amongst oil producers. Although the production of oil in commercially important quantities dates only from 1904, in 1921 Mexico produced 29 per cent. of the world's total. Legislation and the disturbed state of the country interfered with the industry and many of the wells became exhausted, whilst important new fields have not been found, so that by 1933 Mexico was only producing 2·5 per cent. of the world's total. The fields lie near the Gulf Coast, around the port of Tampico.

Russia has both a large output (see table on p. 249) and great potentialities. The Trans-Caucasian oilfields belong to a larger region, extending from the Crimea in the north-west along both sides of the Caucasus, and along the northern frontier of Persia to Merv and Sarakhs in the south-east, a region in which petroleum is known to exist at many points ; but there are two small districts, one near the Caspian Sea, and one near the Black Sea, both on the south side of the Caucasus Mountains, in which the supply of oil in this region is peculiarly abundant. One of these is the district

round Baku, on the peninsula of Apsheron, which juts eastwards into the Caspian Sea. In this district, which is by far the richer of the two, inflammable oils have been known to exist from a very remote period, and gases burning constantly as they escaped from the earth were visited for ages by Persian fire-worshippers ; but it was not till long after this territory finally passed from Persia to Russia, in the beginning of the nineteenth century, that any attempt was made to utilise commercially its wealth in oil, and not till the latter part of that century that its working was taken in hand in good earnest. In 1832 the district produced only 48 barrels of crude oil. In 1883 the total production of the Russian Empire (nearly all in this district) was still under 250 million gallons, as against 820 millions in the United States. In the early part of 1900 a pipe-line upwards of 140 miles in length was opened from Baku to Mikhailovo, near the eastern end of the Suram tunnel, and this line was afterwards continued to Batum. Petroleum is produced also in other parts of Trans-Caucasia, and more abundantly in the Grozny district (Terek territory) in the east, and the Maikop district (Kuban territory) in the west of Cis-Caucasia. The Russians claim also to have discovered a long line of fields on either side of the Urals.

South America. The countries of South America are now rapidly assuming great importance. In Venezuela, now the world's second producer, extensive fields lie round the shallow Gulf of Maracaibo ; Peru, Argentina, Ecuador, and Colombia are yielding rapidly increasing supplies, whilst important oil-pools are worked in the British island of Trinidad. Except in Argentina where the production is largely in Government hands, exploitation in South America is largely by British and American companies.

Other Countries. In Canada hopes are entertained of developing fields in the 'tar-sand' region of Alberta and in the frozen north near the lower reaches of the Mackenzie River. The growing production of Canada comes mainly from Alberta and Ontario. In Europe, outside Russia, the principal districts producing mineral oil lie on the outer slopes of the Carpathian Mountains, in Poland and Roumania. Germany possesses several wells (in Hanover), and France is the only country to practise the **mining** of oil sands (at Pechelbronn). During the Great War much money was spent in prospecting for mineral oil in England but, despite a small production from the bore at Hardstoft in Derbyshire, the attempt was a failure. A renewed search began in 1935. In Asia, Burma has long been known for its mineral oil and has maintained a comparatively steady output of about 8,000,000 barrels for many years. An increase is unlikely. There are small fields in the Punjab and Assam. Large supplies are now obtained in the Dutch East Indies, particularly in Java and Sumatra ; whilst the production in Borneo

is increasing. Japan has a small output. A very important field is worked at Maidan-i-Sulaiman in Persia by the Anglo-Iranian Oil Company. In 1914 the British Government became a shareholder in this company to the amount of £2,000,000. A pipe-line connects the field with the head of the Persian Gulf. Still more recent are the rich discoveries in Iraq—from which pipe-lines to the Mediterranean at Tripoli and Haifa were constructed in 1935. There are great possibilities of further development in Persia and Mesopotamia. In Africa the principal oil wells are those of Egypt, on the west coast of the Red Sea, opposite the end of the Sinai Peninsula. Despite a prolonged investigation, the search for oilfields in Australia has been disappointing, though fields have been discovered in New Guinea.

Ozokerit or earth-wax is a natural product resembling solid paraffin. It occurs in large quantities near the Caspian Sea, but the chief commercial supplies were formerly drawn from Drohobycz and other places in Galicia (Poland). It is difficult to refine, but yields a peculiarly fine kind of wax very suitable for making candles of a high melting-point. The light given by such candles is as 10 : 7·5 of that from sperm, and as 10 : 7 of that from wax candles.

Asphalt or Mineral Pitch is a solid or nearly solid substance which results from the evaporation of the lighter fractions of natural oil or the thickening of petroleum through the absorption of oxygen, and is hence met with in the nature either as a superficial layer above deposits of petroleum exposed to the air, or entirely occupying the place of such deposits so exposed. Its chief use is in paving, for which purpose the asphalt of the Val de Travers in the Swiss Jura (canton of Neuchâtel) is a valued material. It is also obtained in the canton of Vaud, and in Germany, France, Italy, and some other European countries. Algeria likewise supplies a considerable quantity of this substance to Great Britain, and a still larger quantity is obtained from the famous Pitch Lake of Trinidad. Among other places where it is found are the neighbourhood of the Dead Sea (hence anciently sometimes known as the Asphalt Lake) and Venezuela.

GOLD AND SILVER. The table on p. 253, of which the 1912 figures are based on estimates published by the director of mints of the United States of America, shows all the parts of the world which in that year produced as much as 100,000 fine ounces of gold or 500,000 ounces of silver. The second column shows the world production in 1928 and the third that of 1935 when the high price of gold in terms of sterling and other ' devalued ' currencies had led to a great resuscitation of mining. For the last forty years the most remarkable gold-producing country has been South Africa.

In 1898, the year before the outbreak of the war in South Africa, the value of the gold produced in the Transvaal was £16,000,000.

The Transvaal has remained by far the most important producing country. After increasing steadily year by year from 1902 onwards it decreased from £38·7 millions in 1912 to £37·4 millions in 1913, and in 1922 had decreased to £29·8 millions. A rapid rise followed and the value reached £44·2 millions in 1929. Even more phenomenal has been the subsequent increase in value.

The gold production of Russia is not exactly known but probably ranks second to that of the Transvaal.

Gold generally occur either in alluvial deposits (into which it has been washed by the degradation of the rocks from which the deposits are derived) or in quartz-veins in a free state. Often it is associated with various metallic sulphides, chiefly iron and copper pyrites, either in quartz-veins or in other forms in which these ores occur, but it is seldom worth extracting except from quartz-veins. From quartz-veins and other hard rocks gold has to be obtained by stamping or crushing, a process involving more expensive machinery than is used in digging for alluvial gold ; but quartz-veins are sometimes capable of being profitably worked to a depth of 2,000 feet or more. The famous ' banket ' of the Witwatersrand from which the bulk of the Transvaal gold is obtained is a hard quartz-ore conglomerate of Pre-Cambrian age, in which the gold is so finely disseminated as to be invisible to the naked eye. The bankets are now worked to a depth of over 7,000 feet.

Gold and Silver Production (in million oz., fine).

Gold.				Silver.			
—	1912.	1928.	1935.	—	1912.	1928.	1935.
Union of S. Africa	9·11	10·12	10·77	Mexico	74·64	104·57	75·61
U.S.A.	4·52	2·14	3·12	U.S.A.	63·77	60·39	41·82
Australasia	2·64	0·63	1·06	Canada	31·63	22·74	15·76
Canada	0·61	1·89	3·29	Peru	8·35	18·30	43·14
Mexico	1·19	0·70	0·62	Australasia	14·74	10·31	12·31
Rhodesia	0·64	0·57	0·73	Japan	4·93	4·53	8·90
Russia	1·07	1·20	5·65	Spain	5·15	3·06	—
British India	0·54	0·38	0·33	C. Amer. & W. Indies	—	3·15	3·00
British W. Africa	0·35	0·16	0·36	Bolivia	4·05	5·40	5·47
South America	—	0·42	0·75	Chile	4·05	2·90	1·31
Japan	0·22	0·31	0·55	British India	0·09	6·02	6·12

Silver ores generally occur in veins, or irregular deposits. But with regard to the occurrence of this metal, it is important that the silver-lead ore sometimes occurs in great quantity in large ' pockets ' or cavities in limestone rocks, which are very productive for a time, but are soon exhausted. It is from such chambers that the greater part of the silver of the United States is obtained, and the production of the United States, having first been raised by this fact to an enormous extent, has now begun to show a less rapid rate of increase. It is since the discovery of the famous Comstock

lode in Nevada in 1859 that the United States rose into importance as a silver-producing country. New discoveries have maintained the output and now the leading states are Idaho, Utah, Arizona, Montana, New Mexico, Colorado, and Nevada—all Rocky Mountain States.

Another matter of importance with reference to the production of silver is that a large proportion of the silver of the world is derived from the desilverisation of ores worked for other metals, principally lead and copper. It is by the desilverisation of copper ore (at Mansfeld in the Harz) that a large proportion of the silver of Germany is produced.

LEAD. The consumption of this metal has greatly increased since the beginning of the nineteenth century in consequence of its use for the smaller gas and water pipes, and in various branches of the arts, as in lining the chambers used in making sulphuric acid. The high position formerly taken by the United Kingdom in this industry has been altered by the fact that lead ores are now generally treated in the countries in which they are now produced, so that the former large import of lead ores is now replaced by that of pig and sheet lead (chiefly from Australia, Spain, Mexico, and the United States). In 1931–35 the chief producing countries in order of importance were the United States, Mexico, Australia, Canada, and Spain. The value of ores of lead varies greatly.

There are various industries subsidiary to that in lead. The most important of these is the extraction of silver, a small proportion of which is nearly always contained in galena, the chief lead ore, a sulphide of lead. White lead, which is very largely used in making painters' colours and in making the glaze on earthenware, is a carbonate of lead or a compound of lead and carbonic acid. Litharge is a lead oxide or compound of lead and oxygen, and is a yellowish substance used in making the glaze on earthenware and for other purposes. One form of this is called massicot, and from it is made by heating another compound called red lead or minium, which contains a greater proportion of oxygen, and is largely used in the making of flint glass and porcelain, as well as in making red paint.

COPPER. This metal is found in many if not in most countries of the world, sometimes pure (the native copper occasionally forming huge masses), more frequently in the form of ores, which vary greatly in richness. In 1867 Chile, the northern half of which is intersected in every direction by veins of copper, contributed two-thirds of the entire copper-production of the world; but owing to the discovery of rich deposits of copper in other regions less remote from the great markets of the world, its share of the total copper-production has been greatly reduced. As late as 1880 it still stood first in the list of copper-producing countries, but now the **United**

States produces about half the copper of the world, notably in the states of Michigan and Arizona. Central Africa (mainly the Congo), Canada, Chile, Japan, Spain and Portugal, Mexico, Peru, and Germany are the producing countries next in importance. The production of the mines of the United Kingdom is now quite unimportant.

The production of copper in England from home ores has greatly declined since about 1840, but there is a large import of foreign ores and ores which have undergone some preliminary treatment into this country, where it is converted into pure copper, chiefly at Swansea. The greater part of the import of impure copper is in the form of regulus and precipitate of copper, both of these being copper ores partially refined, but by different methods of treatment. Copper in these forms is chiefly imported from Canada and Spain. Raw copper ore is chiefly imported from Canada; but there is a much larger import of metallic copper, unwrought, from the United States, Chile, and Australia.

Being an excellent conductor of electricity, copper has had its use greatly extended of later years in making telegraph-wires for underground communication and marine cables. So many industries require copper that it is regarded as a 'key' metal. Apart from the electrical industry the chief uses of copper are in the making of brewers' and distillers' plant, in the making of armament, in shipbuilding, the making of plates for the printing of textiles, and in the dye industries. Copper is one of the ingredients in the two important alloys known as **bronze** and **brass**, the former composed of copper and tin (a very hard compound), and the latter of copper and zinc.

ZINC. This metal was first known in Europe only as an import from China and India, where it had long been employed in the manufacture of brass. The principal ores are zinc-spar or calamine, a carbonate of zinc, and zinc-blende or sulphide of zinc, both impure, and the methods of treating them were discovered in Europe only in the eighteenth century. In that continent Germany and Belgium were long the chief producers. Belgium retains second place to the United States as a world producer and there is a large output from both Poland and Germany. The Commonwealth of Australia now produces a great deal of both the ore and the metal. A large quantity of zinc is likewise produced in the United States, chiefly in a district in the south-east of Kansas and the south-west of Missouri, in the Ozark region (Jasper co.).

TIN. The tin-mines and other deposits of Cornwall and the adjacent parts of Devonshire, which perhaps supplied the Phœnicians with tin three thousand years ago, continued to be almost the sole source of supply of this metal till within the last two hundred years or so. The region just referred to is still the only significant place of production in Europe, but important deposits of the ores of this

metal are now known to exist in many other parts of the world, and the United Kingdom now imports far more tin than it produces. The principal sources of this import are Malaya, with the neighbouring parts of Burma and Siam. The islands of Banka and Billiton, belonging to the Dutch East Indies, also yield large quantities of tin, but this is sent mainly to Holland, whence considerable quantities are re-exported to the United Kingdom. New South Wales, Victoria, and all the other Australian states, including Tasmania, produce more or less tin. In South America, Bolivia, Peru, and other countries are known to be rich in tin ores, and Bolivia produces about a quarter of the world's tin. In Africa Nigeria is an important producer.

Tin ore is met with either in veins (or lodes) in the rock, or in alluvial deposits. The former is called mine-tin, the latter stream-tin. The stream-tin, being generally near the surface, is naturally the easiest to obtain where it is abundant; and it is the abundance of such deposits in Malaya that makes that part of the world such an important source of supply at the present day. Most of the tin ore of the world is the oxide, cassiterite, which being both heavy and stable, tends to be found concentrated at the base of gravel and can easily be separated by washing from the lighter constituents. Tin is mostly imported in the metallic state or as a concentrate for further refinement. Tin is largely used to cover sheets of iron or steel with a coating as a protection against rust, and thus to form tin-plates, or, alloyed with lead, to form terne-plates.

MERCURY or QUICKSILVER, the only metal fluid at ordinary temperatures, has long been principally obtained in Europe from the Spanish mines of Almaden in the Sierra Morena, which were worked even under the Romans. In 1887 Spain furnished more than four-fifths of the total quantity of this metal imported into Great Britain. The other European countries which produce much of this metal are Italy, chiefly from the long-celebrated mines of Idria in the former Austro-Hungarian crownland of Carniola, and from mines at Amiata in Tuscany. In recent years the relative productions of Spain and Italy have fluctuated. Since 1850, when the celebrated mines of New Almaden in California (Santa Clara co.) were opened, large quantities of mercury have also been produced in the United States, the mines of which country have in many years furnished more than those of Spain and Italy together. The New Almaden production was later exceeded by that of Idria or New Idria in San Benito co., the county just south of Santa Clara co. After 1877 there was great decline in the total value of production and imports are now large. Quicksilver is also produced in Czechoslovakia, Russia, China, Mexico, and Peru.

The uses of mercury are various. In its pure state it is chiefly employed in the making of scientific instruments. Combined with

other metals, it forms what are called amalgams, which are soft and easily fusible. An amalgam of mercury and tin was once largely used in the silvering of mirrors, but is now generally replaced by electro-deposits of silver. In mining for silver and gold these metals are frequently extracted by employing mercury to form amalgams with them, and the large amount of mercury required for this purpose in the extensive silver-mines of California and Nevada, near the chief seat of the United States production of quicksilver, is one great cause of the extensive demand in the United States for the latter metal.

IRON. The uses of iron are too numerous to specify, and for the most part too familiar to need specifying. No other metal can fully supply its place. No other metal is produced in such abundance or over so large an area of the world. At the present day, indeed, none but the most backward tribes in a few out-of-the-way islands and corners are unacquainted with its working. Its use in the past goes back to a remote antiquity—how remote it is impossible to say. The iron implement brought to light in 1837 by Mr. J. R. Hill walled up in one side of the Great Pyramid of Gizeh carries us back about 5,000 years. The explanation of the rarity of the remains of ancient iron implements as compared with those of bronze is to be found in the fact that under the influence of air and moisture iron is eaten away so rapidly that its preservation for a long period is possible only under very exceptional conditions. So liable is it to disappear that, of all the numerous articles of iron that must have existed in ancient Egypt, the remnants that have been discovered do not weigh in all more than a few pounds, and this in a country with a dry climate specially suited to the preservation of such articles.

The discoverers of the New World stated that the inhabitants of the parts which they first touched at, the West Indies and Darien, were unacquainted with iron, and their statements have frequently been made to apply to the whole of America, including the civilised empires of Mexico and Peru. But against this idea there is the express testimony of several contemporaries of the first explorers—testimony from which it appears that the working of iron was practised before the arrival of the Spaniards in various parts of the American continent, and there is evidence of other kinds to show that it must have been so in other parts regarding which we have no direct statements on this head.

But ancient and widespread as the iron industry is, its rapid growth in modern times, and in particular since the close of the eighteenth century, is an astonishing fact, or would be so if we did not bear in mind the other great developments in industry and commerce within that period. In 1740 the whole production of iron in England is estimated to have been only about 18,000 tons; even in 1796, after the introduction of spinning machinery, only 125,000

tons. The enormous growth since then—it reached 10 million tons in Britain alone in 1913—is the result of the vast demand for this material which has arisen from its use in machinery, railways, shipbuilding, and the making of bridges and other structures. Iron is, in fact, the second of the two great material factors concerned in maintaining modern industry and commerce on a large scale, coal being the other. The history of iron in many of its details is of singular interest, not only as showing how the volume of iron production has been raised to its present pitch, but also because some of the facts in that history have had an important effect on the geographical distribution of the industry.

Iron, it must here be explained, is not found native in nature but has to be extracted from ores, which vary greatly in their richness and the nature of the other substances with which the iron is combined. The ores have to be smelted or reduced to a metallic condition by heat and chemical action, and most of the iron then sinks to the bottom of the furnace and is run off into moulds. This is what is called **pig-iron** or **cast-iron**, and is never pure. It always contains a considerable proportion of carbon, of which pure charcoal is one of the forms; sometimes it contains substances much more injurious to its quality, the most prejudicial being **sulphur** and **phosphorus**. Even the carbon is injurious to some extent, and renders cast-iron brittle and unfit for use in the making of anything which has to stand a severe strain. It is for this reason that, by driving out almost all the carbon, cast-iron is converted into wrought or malleable iron, which does not harden greatly when cooled suddenly. This is usually effected by a process called puddling, which consists in remelting the cast-iron on the hearth of a furnace, and stirring it about when molten with a rake, which causes the carbon to escape and get burnt up in the intensely heated air of the furnace. As the carbon escapes the fluid becomes pasty, and the iron is then brought away in large lumps, and afterwards hammered into rude slabs called blooms, and rolled out to form bars, sheets, &c. In this form of iron there remains an admixture of slag or 'cinder.' The process of driving out the carbon was greatly quickened by the invention in 1784 of the reverberatory furnace, in which the charge of iron is placed in a separate chamber from the fuel and thus protected from the carburising action due to the combustion. This invention was due to Henry Cort in England, who in the previous year had introduced grooved rollers in rolling-mills for the production of bars of definite shapes.

The material so formed is very tenacious and tolerably hard, but for some purposes not sufficiently hard. For the making of most machinery, weapons, and cutlery of all sorts, a kind of iron is required which, besides being very tenacious, must also be flexible, elastic, and very hard; and for these and other purposes iron is

converted into **steel**, which is nothing else than a form of iron containing a small proportion of carbon. The term steel is now confined to products which contain between 0·3 and 2·2 per cent. carbon, that is, enough to make them harden greatly when cooled suddenly, but not enough to prevent them from being usefully malleable at some temperature. The name of weld-steel is given to all varieties of iron made by the old puddling process above described, but containing carbon within the limits stated as well as an admixture of slag. The best steel, however, is free from slag.

The history of the iron industry consists in a gradual series of improvements in the methods by which all these processes are carried on. Only a few of the great steps in advance can here be mentioned; but with reference to these it ought to be explained that the most important of these improvements, associated with the names of certain inventors, are in many cases only slight modifications of methods which in the course of the gradual development of this industry had been previously suggested; modifications, however, which were just what was needed to make the methods practically useful.

In ancient times, when the methods of working iron were very defective, good iron could be made only from the best ores, and hence districts containing ores of fine quality had the principal trade in iron. During the early history of Greece certain tribes inhabiting the northern slopes of the tableland of Asia Minor, to the west of Trebizond, among others the Chalybes, seem to have carried on a large trade in iron for this reason, and from them the Greeks derived their word *Chalybs* for hard iron or steel. To the Romans were known many deposits of iron ore, including the rich ores of Bilbao, in the north of Spain. Remains of Roman ironworks are found in various parts of Great Britain, but so imperfect were their methods of smelting, so small a proportion of the iron was obtained from the ore, that the slag or refuse material from the smelting furnaces of the Forest of Dean, in Gloucestershire, supplied at a later period the only ore required for the furnaces of that region for a period of between two and three hundred years. At the same time these old Roman methods were very expensive.

Down to a comparatively recent date one reason of the limited and costly production of iron was that wood or charcoal was the only fuel used in smelting; and this fact had an important effect both on the geographical distribution of the iron industry, and on the aspect of those regions in which that industry was long pursued. Iron could be smelted only in the neighbourhood of forests, and in process of time forests were cleared in feeding the furnaces. The forest from which the Weald takes its name perished in supplying fuel to the iron-furnaces of Kent and Sussex, the last of which was blown out early in the nineteenth century. An English parliamentary

report of the year 1719 makes strong complaint of the devastations wrought by the ironworks in the counties of Warwick, Stafford, Worcester, Hereford, Monmouth, Gloucester, and Salop. About twenty years later the English import of foreign iron was computed at about 20,000 tons annually—ten per cent. more than the home production. The greater abundance of wood in Germany as compared with England was one important reason why the iron industry of the former country was greater than that of the latter even as late as the earlier part of the eighteenth century.

Coal was first used with practical success in the smelting of iron by Dud Dudley (son of Lord Dudley) in 1619, but the practice was then followed only by himself, and the knowledge of it died with him. The use of coal in the form of coke was introduced by the Darbys of Coalbrookdale early in the eighteenth century, but the process was kept a secret by them, and it was not till after the middle of that century that it became generally known. Some coals, such as the splint coal of the Glasgow district, are capable of being used in the blast-furnace even without being made into coke. Though a great economy is effected by the use of coke or coal, yet even in the improved furnaces of the present day, such fuel does not make so pure an iron as charcoal, inasmuch as it usually contains sulphur and other ingredients more or less noxious. In Sweden and Russia, the two European countries richest in forests, charcoal is still used in some iron smelting-works, and to this fact the high quality of Swedish iron is partly due.

Besides coke or other fuel, it is necessary in the case of most kinds of iron ore to put into the smelting- or blast-furnace along with the ore a certain quantity of a material intended to facilitate the reduction. The material so employed, called a flux, is generally limestone or lime; and consequently facilities for obtaining this mineral form an important geographical factor affecting the prosperity of the iron industry in different places. For some kinds of ore, as for that called red hematite, which contains 55–70 per cent. of iron, this is not always required. Most kinds of ore, too, require to be roasted previously to being put in the blast-furnace—an operation performed in kilns or formerly by laying out the ore in a heap mixed with coal in the open air and setting fire to the heap at the end from which the prevailing wind blew. In the case of blackband iron ore, there is generally enough matter of the nature of coal in the ore to render the addition of coal unnecessary in roasting. The effect of the roasting is to reduce the bulk of the ore which has to be put into the blast-furnace, and at the same time to remove by burning most of the sulphur and other substances that can be volatilised. For red hematite this operation is considered unnecessary.

After the introduction of coal and coke in smelting, the next

great step in the economising of fuel was due to the invention of the hot-blast, that is, the practice of raising the air used in blowing the smelting-furnaces to a high temperature before introducing it into the furnace. This invention, due to Mr. Neilson of Glasgow, and first applied in 1828, afterwards, in 1832, first in Germany, still more economically by using the waste gases of the furnace to heat the blast, enables the same quantity of fuel to smelt more iron than could be done with a cold-blast; and the saving by this means has been increased by raising still higher the temperature of the blast. About 1870, in the best-constructed furnaces the blast had a temperature of only about 800° F., but afterwards it was sometimes raised to as high as 1,650° F. Such high temperatures were, however, found to be rapidly destructive to 'pipe-stoves' of the old type, and these are consequently now superseded by a new type of furnace in which the blast is usually maintained between 900° and 1,200°, occasionally at as much as 1,400° F. Blast-furnaces have also been enlarged and improved in construction. In 1880 an out-turn of 115 tons of iron per day was exceptionally large; now the normal output of an average furnace is up to 500 tons a day. Once a modern blast-furnace is shut down it takes two months to restart it, or, if a new lining and hearth are required, about four months. The waste gas which used to be seen burning at the top of the furnaces is now utilised to heat the boilers of the engine employed to work the blast and the hot-air stoves—an idea which originated in France in 1814, though it has been applied in a sufficiently simple manner only since about 1850 (first in South Wales). By all these means the consumption of coal has been so greatly reduced that, whereas in 1796 six tons of coal were required to produce one ton of iron, two tons of coal ($1\frac{1}{4}$ of coke) now suffice for that production. A further great economy in the iron industry has been made where the iron is worked up in the same establishments in which it is extracted from the ore. The gas of the blast-furnaces is then employed also to drive the rolling-mills and other engines, and the heat of the molten cast-iron is not lost till the iron is delivered as rails or in some other form. Recently iron ores have also been smelted by electricity. At the beginning of the present century there were very few electric furnaces, but between 1913 and 1920 the number in the world increased from 140 to 1,025, mainly for refining steel and other metals. In 1928 there were about 593 electric steel furnaces in the United States alone.

Further great developments of the iron industry have been due to the inventions which have done so much to cheapen the production and extend the use of steel as compared with wrought iron. The old method of making steel by the process called cementation is still the best, and indeed the only method by which steel of the quality required for making good cutlery can be manufactured.

This method consists in sealing up bars of iron in fireclay troughs along with a quantity of charcoal, in which the bars of wrought-iron are embedded, each separated by a layer of charcoal from the others, and exposing them thus to a high temperature for a week or ten days, according to the quality of steel required. At the end of the period the iron is found to have combined with the requisite amount of carbon, but to have become porous and rough on the surface, on which account it is known as blistered steel. This, after being condensed by hammering and rolling, and fused in crucibles to get rid of all traces of slag or cinder, forms the finest kind of cast steel. The hardest steel thus made has about 1·2 per cent. of carbon. The process, from its nature, is obviously a costly one.

There are now many methods of producing **cast-steel** on a large scale, and three of these are sufficiently widely practised to have a geographical interest. The first of these, introduced before 1860, is that which is associated with the name of Sir Henry Bessemer, being employed in the production of what is called Bessemer steel, although the method as now practised in most of the great iron-countries involves an important improvement introduced by Mr. Mushet. By the Bessemer process molten pig-iron is poured into a vessel known as a converter lined with a highly refractory material, usually ganister, so arranged that cold air can be blown through the molten mass, burning away both the carbon and the silicon entirely. The due proportion of carbon is afterwards added and mixed with the fused metal by a repetition of the blowing. As originally devised, this process was found to be unsatisfactory except in the case of a few ores. The resulting product was very brittle, and Mr. Mushet's improvement consisted in adding the carbon in a compound containing manganese, which serves to correct the fault to which this brittleness is due. The compounds employed are spiegeleisen and ferro-manganese, which are made from certain iron ores rich in manganese, such as are found in Spain, the Siegerland district in Germany, Greece, Sweden, and elsewhere. When the ore used in making the pig-iron put into the converter itself contains a sufficient amount of manganese, the use of spiegeleisen or ferro-manganese is not necessary. The amount of iron that may be converted into steel in a single converter at one time by this process varies according to the capacity of the converter. A common size is the 12–15-ton Bessemer converter.

Another process, known as the Siemens-Martin or open-hearth process, differs from the Bessemer process only in that the operations are performed in a different kind of furnace, in which the air employed to remove the carbon plays over the molten metal instead of being blown through it. Some such furnaces even as early as 1902 had a capacity of as much as 100 tons. A common capacity is 50 to 80 tons.

Even with the improvement of Mushet these two processes

are not applicable to all kinds of pig-iron. Neither of them removes phosphorus if the pig-iron happens to contain it. Now steel is rendered brittle by even a very slight proportion of this ingredient. In the best tool steel it is considered that the proportion of phosphorus should not exceed one part in five thousand, in bridge steel one in two thousand, and in rail steel one in one thousand, and with the increasing weight and speed of trains railway engineers became more exacting in this respect. The processes for making steel and ingot iron on a large scale can accordingly be applied in their original form only to iron made from ores in which phosphorus is not contained, or is present only in very small amount indeed. Such ores are known comprehensively as Bessemer ores. In the Old World, the only ore from which iron of this quality can be made in large quantity is the hematite, which occurs in the north-west of England, in northern and southern Spain, in Greece, Sweden, Algeria, and on the island of Elba. So long, therefore, as no process was known for making cast steel on a large scale so as to overcome the above-mentioned drawback, the geographical distribution of these ores was obviously greatly in favour of the English iron and steel industry, for not only did England herself possess stores of the valuable ore in the most convenient situation, but ores from Italy, Spain, and Algeria could be landed after a sea-voyage close beside the blast-furnaces of Newport and Middlesbrough, whereas on the continent a railway journey, or at least a transhipment to river or canal boats, was in most cases necessary to bring them to the districts where the iron industry is pursued.

It was accordingly a discovery of the highest importance for the future distribution of the iron and steel industry when a method was devised by which phosphorus could be removed from the pig-iron in the process of converting it into steel. A practicable method of doing this was invented by Mr. Thomas and Mr. Gilchrist of Middlesbrough, in association with others. The method consists in using for the lining of an ordinary Bessemer converter a composition which, while serving the other purposes of the lining, has such a chemical action as to remove any phosphorus that may be present in the iron poured into the converter. Lime is mixed with the lining to serve as what chemists call a 'base,' with which the phosphorus, quitting the iron, may combine; and the process is hence known as the basic process. If the proportion of phosphorus be too great to be removed by that means alone, additional lime is added in some form in the converter along with the metal. This process was first practically applied in 1879, and besides making the ores extracted round Middlesbrough (the Cleveland ores) for the first time available for the manufacture of mild steel or ingot iron, has enabled the mainland of Europe to compete with the United Kingdom in the iron industry more keenly than hitherto.

The basic process was first applied in the United States in 1890, but has since then made rapid progress. In the United Kingdom it is not so largely adopted as it now is both on the continent and in the United States, the reason probably being that it is not so conveniently applied to the open-hearth as to the Bessemer method of making steel, and open-hearth plates are those which are preferred by shipbuilders, to whom is due a large demand for British steel. Later processes have, however, been devised for facilitating the manufacture of basic steel by the open-hearth method.

In recent years various compounds of steel with other metals have been made for special purposes, increasingly with the use of the electric furnace. One of these is **nickel-steel,** which contains from 3 to 3·5 per cent. of nickel, and about 0·25 per cent. of carbon, and is much tougher and stronger than ordinary steel, and yet extremely ductile. The combination of properties causes nickel-steel to be used as material for the armour plates of war-vessels—at least when the outer surface is hardened by some carburizing process, followed by sudden cooling. **Manganese steel,** which contains from 12 to 14 per cent. of manganese and 1·5 per cent. of carbon, has extraordinary tenacity, but appears to be too expensive a product for ordinary use. This largely arises from its extreme and irreducible hardness, which necessitates it being cut by special instead of the ordinary tools. **Chrome steel** contains about 2 per cent. of chromium and 0·8 per cent. of carbon. When suddenly cooled it is not only extremely hard but highly elastic, which makes it peculiarly suitable for use in the making of armour-piercing projectiles. It is also proof against the burglar's drill. **Stainless steel,** which is used for making cutlery, but also a great variety of other articles liable to be exposed to contact with water in any form, contains about 13 per cent. of chromium and other metals, according to the special type. What is known as **high-speed steel** is an alloy containing in its best varieties between 5 and 6 per cent. of chromium and about 18 per cent. of tungsten, with less than 1 per cent. carbon. It remains hard at a temperature of even 750° F., and is hence well suited for the manufacture of turning lathes used in cutting thick slices, a process in which the great friction develops very high temperatures. Where lightness as well as great hardness and power of resisting shock is important, as in the steel used in some parts of automobiles, a small quantity of vanadium is now frequently combined with chromium. Steel containing both nickel and chromium is regarded as essential in the making of aeroplanes.

From the nature of the **iron industry** as now pursued it follows that it is most largely developed in those countries which stand first in commerce and manufacturing industry generally. The consumption of iron and steel is relatively high in two regions: first, one in

which there are vast movements of produce, as in new and sparsely peopled countries in which iron and steel enter largely into use in connection with the transport and handling of grain, &c.; and, second, one in which raw materials are subjected on a great scale to changes of form. It is in the latter, that is, in the manufacturing countries, that the demand is greatest in the aggregate, and some of the most important products of the industry required in the thinly peopled regions, such as rails, rods, sheets, structural forms, wire, &c., can be transported in a finished form or a form that involves little or no waste in their ultimate use. The following table and diagram (on p. 266) give some interesting data of the distribution of the branches of the iron industry :—

Country.	Average annual production of pig-iron in millions of tons.					Percentage of total of five countries.				
	1871–75	1881–85	1911–13	1927–29	1935	1871–75	1881–85	1911–13	1927–29	1935
U. Kingdom	6·5	8·1	9·7	7·2	6·5	52·0	44·2	15·6	9·8	13·0
U. States .	2·2	4·3	28·1	39·1	21·7	18·0	23·5	45·2	53·8	43·4
Germany .	1·9	3·4	17·3	12·7	12·8	15·4	18·3	27·9	17·5	25·6
France .	1·2	1·9	4·8	9·0	5·8	9·9	10·2	7·7	13·6	11·7
Belgium .	0·6	0·7	2·2	3·8	3·1	4·7	3·8	3·6	5·3	6·3
Total .	12·4	18·4	62·1	72·8	49·9	100·0	100·0	100·0	100·0	100·0

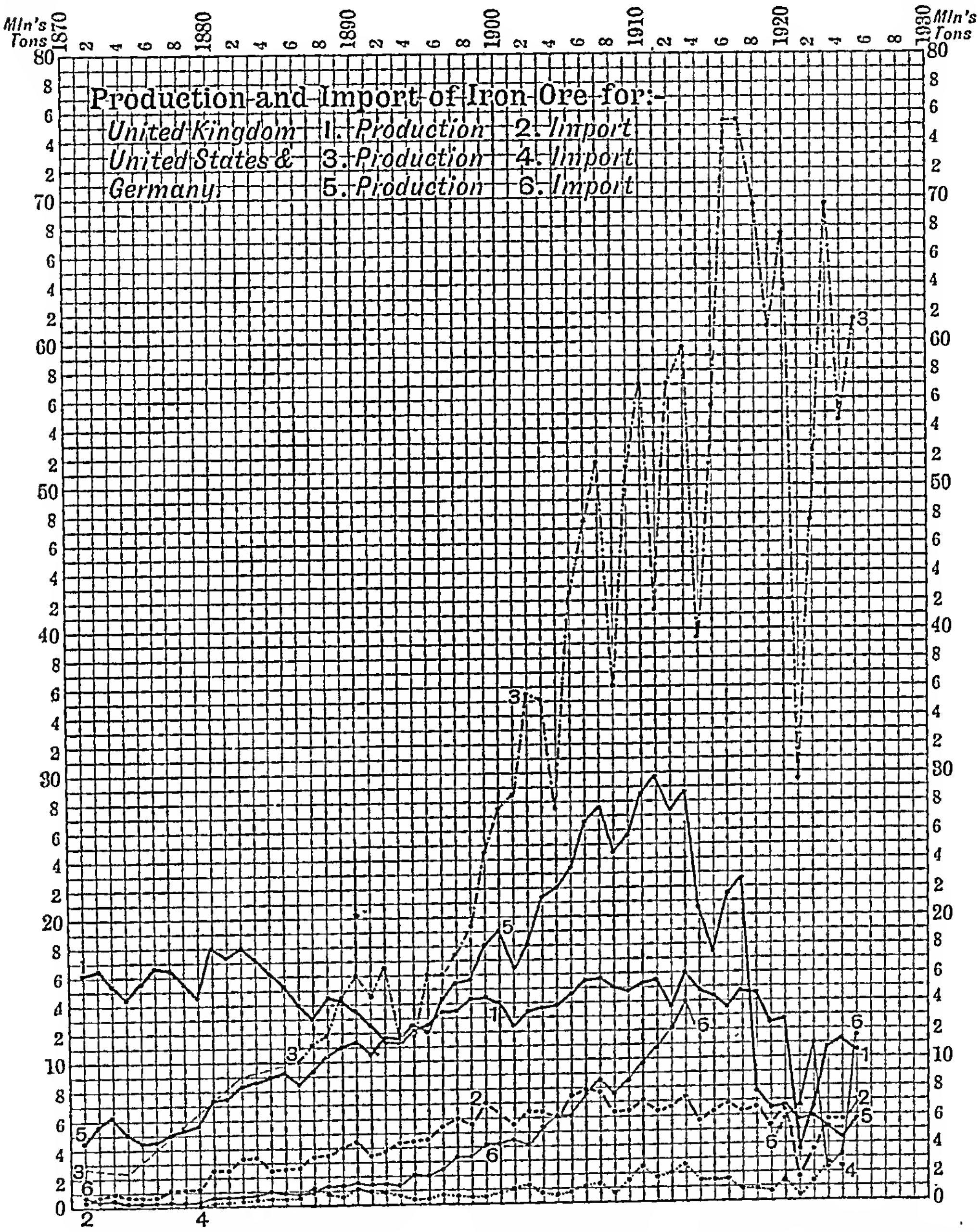
World Total, 1935 : 73·6 (Russia 12·5, Japan 2·8).

The following table shows the production of steel in millions of tons :—

	U. States.	Germany.	Britain.	France.	Belgium.	Russia.	World Total.
1913	31·3	17·3	7·7	4·6	2·4	—	75·4
1924	37·9	9·3	8·2	6·8	2·8	—	73·6
1925	45·4	12·2	6·1	7·3	2·4	—	89·3
1930	40·2	11·5	7·4	9·4	3·4	5·7	95·4
1935	35·0	16·2	10·2	6·2	3·0	12·4	98·8

The diagram shows first that the production of iron in the United States first exceeded that of the United Kingdom in 1889 and has rapidly outstripped that of Germany since 1895. It also suggests one circumstance that may help to account for that. The United Kingdom is no longer able to keep pace within its own borders with the demands for iron ore, but has become more and more dependent on imports. On the other hand, our two great rivals are better furnished, though Germany's position was changed by the loss of the Lorraine deposits after the War. The diagram shows that the United States production of iron ore still keeps pace with that of pig-iron.

In the pages which follow will be found maps of Britain, Central Europe, and North America showing the chief centres of iron-ore production. The indications of relative importance on these maps are based on values, not quantities, seeing that a ton of iron ore means in different cases such very different things, in consequence of differ-



ences in richness and freedom from noxious impurities. But the maps do not indicate all the advantages of situation. In Germany, the iron industry was greatly stimulated by the improvement in the Rhine navigation made towards the close of the nineteenth century. In the United States it will be noticed, in the map including the northern parts, that the area of greatest production is far from any coal-fields; but this is compensated by the mode in which the deposits occur.

They lie in enormous quantities, capable of being quarried with exceptional ease, and of being handled and transported both by water and rail at an exceedingly low cost. On the lakes the ore is carried in large vessels, some of more than 12,000 tons, which, on reaching the lake-port for which they are bound, may have their entire cargo carried in six or seven trains of 50-ton steel railway wagons to a great iron- and steel-working centre like Pittsburgh ; whence return cargoes of coal can always be obtained in consequence of the abundance of coal at that centre and its deficiency in the region round the lakes.

But, further, we have to consider the market. In this case the development of the industry was greatly assisted in the countries of both our rivals (as well as many others) by protective tariffs securing so far as possible the home market. With regard to that point all that the geographer has to note is the extent and importance of the market so secured, and it is a vital consideration that within its own borders the United States offers the largest (the wealthiest, though not the most populous) free-trade market in the world for the products of this as of most other industries, and that pre-War Germany (the German Customs Union) was one of the largest on the mainland of Europe. But apart from that it is important to remember that the great markets for iron and steel products are the most advanced industrial countries generally—for the most part so situated that they can be reached from inland centres of production in Europe and North America without break of bulk.

These industries demand the highest organising capacity and great supplies of skilled labour of all kinds, and hence are of such a nature as to be much more difficult to establish in small local markets than the textile industries. This is particularly true of some of the more complicated branches of the iron industry. And hence in the more advanced industrial countries we find a rapid expansion of the machine industries compensating in some measure a less rapid advance of those connected with textiles. This is illustrated by the high place still occupied by machinery amongst British exports as shown in the tables in the section on Britain. Yet under this head also we can see the operation of decentralising tendencies. Though our rivals are fewer in number in this than in the textile industries, still for many years past the exports of machinery from the United States and Germany have been growing more rapidly than our own.

Relatively to population Sweden has a large iron industry, due to the great abundance as well as to the excellent quality of its ores, and to the plentiful supply of charcoal fuel for smelting and latterly to the development of hydro-electric power. The countries listed in the table on p. 265 have not always been the first five. The production of pig-iron in pre-War Russia exceeded that of Belgium

from 1888, and that of France from 1899. The average annual production of pig-iron in Russia increased from 386,000 tons in 1871–75 to 2,192,000 tons in 1896–1900, 2,794,000 in 1906–10, and 4,047,000 in 1911–13. In 1925 it showed the first real signs of recovery from the period of war and revolution and the output was 1,284,000 tons; in 1929 it reached 4,018,000 tons, and in 1935 12,480,000. The production of Austria-Hungary also got ahead of the Belgian production in 1889. Luxembourg is of enormous importance relatively to her size. Czechoslovakia is of importance also, and Japan has recently come to the fore.

The very rapid increase in the consumption of iron in recent years has frequently excited apprehensions as to the possible exhaustion of the supply. These apprehensions led to an inquiry being made into the subject at the instance of a committee appointed by the Eleventh International Geological Congress held at Stockholm in 1910. The results given in the summary of the returns by Professor Hjalmar Sjögren are admittedly to be regarded as only very rough estimates, but they are here reproduced for what they are worth. The reserves are classed as actual and potential, according as they refer to areas now actually worked, or areas containing ores that may become available through the extension of the means of communication and the improvement of our technical knowledge.

—	Actual reserves. Millions of tons.		Potential reserves. Millions of tons.	
	Ore.	Iron Content.	Ore.	Iron Content.
Europe	12,032	4,733	41,029	12,085 + Considerable
America	9,855	5,154	81,822	40,731 + Enormous
Australia	136	74	69	37 + Considerable
Asia	260	156	457	283 + Enormous
Africa	125	75	Many thousand	Many thousand
	22,408	10,192	>123,377	>53,136 + Enormous

As the present annual production of pig-iron is about 70 millions of tons, and of steel about 80 millions of tons, it thus appears that the 'actual' reserves would not suffice for even a century, even if there were no further increase in the annual production which there is likely to be. Of the known deposits of ore containing 60 per cent. of iron or more, by far the most extensive are those of northern Sweden, estimated to amount to 1,035 millions of metric tons, containing 673 million tons of iron. Next come the deposits of Krivoi Rog, estimated at 86 million tons, with 53·5 million tons of

iron. The total quantity of such ores classified as 'actual reserves' is only 1,300 million tons, in addition to which there are estimated to be 687 millions of 'potential reserves.'[1] Since the date of this survey vast new deposits have been located in many parts of the world, *e.g.* in Russia, South America, and Africa.

SALT. This product, so universally used and so widely distributed, is more an article of local production in almost all countries than an article of international commerce. It is obtained, as is well known, both from deposits on the land (rock-salt and brine pits) and by the evaporation of sea-water. In the production of salt the United States, Germany, the United Kingdom, India, Russia, France, Spain, Galicia (Poland), Italy, and Portugal, are the leading countries. The United Kingdom has by far the largest consumption of salt per head, which is in a great measure due to the use of this mineral in the arts. The chief salt-exporting countries are the United Kingdom, Spain, Portugal, and Germany. Portugal is noted for the excellence of its bay-salt. In tropical countries with an excess of rain there is apt to be a deficiency of salt, and hence India imports (largely from Aden, Egypt, and the United Kingdom) upwards of 500,000 tons annually.

MINOR MINERALS

Antimony, employed to give hardness to softer metals in various alloys, more particularly in the making of type-metal, bell-metal, and Britannia metal, and also used for making antimonial lead for storage batteries and for pigments ; produced in America and Great Britain from ores obtained principally from China.

Manganese, an indispensable constituent of certain compounds of great importance in the making of steel. One of its ores, known as the black oxide of manganese or pyrolusite, is also largely used in the manufacture of bleaching-powder, and in glass-making as a decoloriser. Manganese ore is obtained from various parts of the world, but at present is most abundantly imported into Great Britain from India, Trans-Caucasia, and Brazil. A manganese ore suitable for the making of ferro-manganese is found in Merioneth and elsewhere in Great Britain. In the United States ores of this metal are worked chiefly in Minnesota, Montana, and Wisconsin. Recently the metal manganese has come to be used in various alloys. With copper it produces a very tenacious kind of bronze ; with copper and zinc, sometimes with the addition of a little iron and nickel, a substance resembling nickel.

Chromium, a metal occurring in nature chiefly in the form of chromate of iron or chrome iron ore, which is used not only in

[1] *The Iron Resources of the World*, vol. i., p. xxi.

steel-making but also in the manufacture of bichromate of potash from which various pigments are derived. In recent years chromium plating has largely replaced nickel plating as it gives a bright metallic surface, which is stainless and does not tarnish. Rhodesia is the largest producer of the ore, followed by Yugoslavia, India, and South Africa. Chromium-cobalt alloys, sometimes with the addition of tungsten or molybdenum, are used under the name of stellite in the making of high-speed cutting tools containing no iron.

Arsenic is another metal chiefly used, not by itself but in its compounds, which are largely manufactured in the United States, Germany, England, and elsewhere for use in medicine, in the manufacture of weed-killers and insecticides, and in the preparation of green pigments.

Bismuth, chiefly used to give increased fusibility to various metallic alloys, and in the manufacture of certain colouring matters, is produced mainly in Bolivia, the United States, and Spain.

Platinum, a rare metal, but indispensable in the chemical arts on account of its resistance to heat and acids, which renders it the best material for making crucibles and vessels required for certain purposes. It is obtained in Colombia, in the Ural region in Russia, in Canada, the United States, and South Africa.

Nickel, sometimes used, among other purposes, for coining; formerly produced mainly in Germany, but now more abundantly in New Caledonia, and still more so in Ontario, where three-quarters of the world's supply is obtained in the Sudbury district. The metal is used in steel-making and in plating. Monel is an alloy of nickel (nearly 70 per cent.), copper, iron, and manganese, strong and easily machined and little liable to corrosion: so called after its inventor.

Cobalt, in one of its forms found associated with nickel, and hence largely produced in Canada and New Caledonia. Its principal use in the arts is in the form of the oxide, which is used as a blue colouring-matter for pottery and glass, and in that of smalt, which is finely ground glass coloured with this oxide, and is used in colouring paper, &c.

Aluminium is a metal valuable for its lightness, bright colour, its resistance to the action of air even in the presence of moisture, and the excellence of its alloys, especially aluminium-magnesium (Duralumin). Aluminium is now sometimes used for the transmission of electrical currents, giving nearly twice the carrying power of copper. Till lately the metal was made only by expensive processes from two compounds found in nature, one called bauxite, which is obtained from the south-east of France, Styria, Ireland (co. Antrim), the United States (Alabama, Georgia, and Arkansas), and elsewhere, and one called cryolite, obtained from the west coast of Greenland. Now an electric furnace is universally used as the

means of extracting this metal, and both bauxite and cryolite are used in the process, the bauxite, however, furnishing all the raw material, which the cryolite (sometimes made artificially) merely serves in a molten state to dissolve the bauxite (hydrated alumina), which is then easily decomposed by the electric current. The cryolite is used over and over again. Very high temperatures being required, aluminium factories are usually erected where much water-power is available, as at Niagara Falls, on the Saguenay River in Canada, in Norway, the south-east of France, above all at L'Argentière on the Durance in the Briançonnais, Rheinfelden in Switzerland, and at Kinlochleven on the borders of Argyllshire and Inverness-shire, and elsewhere. Formerly France was the chief continental producer but now Germany and Norway come first. In our own country its manufacture is recognised as a key industry on account of the metal being essential in the construction of aircraft.

Tungsten or **Wolfram,** which has considerable importance from its being used in the production of high-speed steel, was mined in Cornwall, but is now obtained mainly in China, Burma, the United States, Malaya, and Bolivia.

Sulphur, used in making sulphuric acid, in vulcanising, and also as a remedy for certain vine diseases ; is exported as such chiefly from Sicily, and as a constituent of iron pyrites, chiefly from Spain and Portugal. From 1903 sulphur has been produced in large quantities in Louisiana, U.S.A., from subterranean deposits where the sulphur is fused by forcing down hot water and when fused forced up to the surface by compressed air. This interesting mine was abandoned in 1924, and the American production now comes from Texas.

Mineral Manures. Among these the most important are :— (*a*) **Potash.** (*b*) **Nitrate of soda,** used both as a manure and in the arts, enters into world commerce as a product of northern Chile. Chile in 1913 was estimated to furnish about three-fifths of the world's supplies of combined nitrogen ; in 1925 rather over two-fifths, and in 1928 only 23 per cent. The decrease is mainly due to the competition of artificial fertilisers, especially those produced by hydro-electric power in Norway and elsewhere by the fixation of atmospheric nitrogen. (*c*) **Phosphate of lime,** produced most abundantly in Florida (at different places near the west coast) and central Tennessee, U.S. ; in Morocco, Algeria and Tunis, in Egypt, and near Liége, Belgium ; small quantities are obtained in the form of **apatite** in Canada and Norway, and in an impure form in England (Cambridgeshire) ; and in that of **phosphorite,** in Spain (Estremadura). (*d*) **Guano,** properly speaking, an animal product, since it consists of the droppings of birds accumulated through ages in regions where there is little or no rain to wash away the deposits so formed. It is, however, worked as a mineral, and may be

described as an earthy nitrate or combined nitrate and phosphate rock. Guanos of one kind or another are derived from islands on the west coast of Peru (the Lobos islands, between 6° and 7° S., yielding a lightly phosphatic product), from the Seychelles and Falkland Islands, from various oceanic islands, including Nauru, situated in about ½° S. to the N.E. of the Solomon Islands ; Ocean Island, between that and the Gilbert group ; Makatea, a French island to the N.E. of Tahiti in about 15° S., 148° W., and both the Christmas Islands, the British island in the Indian Ocean, and the American in the Pacific in 1° 40′ N., 157½° W. (*e*) **Basic slag.**

Borax, a compound of boracic acid and soda, found in many parts of the world with a very dry climate, such as the states of California and Nevada in the United States, the western strip of Peru and Chile, Tibet and Asia Minor, and also manufactured from boracic acid obtained by concentration from springs in the south of Tuscany. It has very varied uses in the arts. Among the most important are its employment in the making of enamel and glazes for pottery, and in the making of certain kinds of glass, the borax serving to some extent as a substitute for silica.

Nitrate of potash. See p. 286.

Graphite or **plumbago,** popularly known as 'black lead,' a substance familiar from its domestic uses and its use in the making of lead pencils, but also very largely employed in making crucibles and type-metal and for other purposes. Formerly the best kind was obtained from Borrowdale in Cumberland, but Ceylon, Madagascar, and Japan are now the chief sources of supply. In Europe it is produced in Germany, Czechoslovakia, and Italy; in America, in the United States and Mexico.

Lithographic stone is known to occur in various places, but the best stones are all obtained from the quarries of Solenhofen in the neighbourhood of Donauwörth in Bavaria.

Grinding and polishing substances. (*a*) **Buhrstones** are the stones used in the old kind of corn-mills, now to a large extent superseded by those in which steel rollers are employed in the manufacture of flour. The best specimens of this kind of stone are obtained in the Paris basin. (*b*) **Grindstones** were formerly produced at Newcastle, at Wickersley (eight miles east of Sheffield), and elsewhere in England, at various places on the Bay of Fundy in the Canadian Dominion, and in Ohio and Michigan in the United States, now almost entirely superseded. (*c*) **Infusorial earth,** or tripoli powder, is a fine siliceous earth used in polishing metals, glass, &c., and now also in the manufacture of dynamite, found not only in Tripoli, from which it takes one of its names, but more abundantly in Germany, on the Lüneberg Heath, between the Elbe and the Aller, and also in Scotland, France, Maryland (U.S.), and elsewhere.

Gypsum is produced in England, chiefly in the counties of

Durham, Nottingham, and Derby. It is used in the manufacture of Plaster of Paris.

Clays. The varieties of clay which have chief commercial value are china-clay and fire-clay. (*a*) **China-clay** is largely worked in the British Isles, in the east of Cornwall and the south-west of Devon. Besides being used in the making of porcelain it is employed in the making of paper and cotton size. (*b*) **Fire-clay**, used in making fire-resisting bricks, crucibles, &c., occurs in many places. In Great Britain the deposits chiefly worked are those found on or near coalfields (south Staffordshire, Glamorgan, Durham).

Asbestos, which now has a great variety of uses—in gas-stoves, for the making of fire-proof curtains, as a packing for cylinders, and as a heat insulating covering for steam boilers and pipes, for making fire-proof paint, wall decorations, clothing for furnacemen and others—is derived mainly from Canada (south of the St. Lawrence), Rhodesia, South Africa, and Russia.

Ganister, a fine hard, pure sandstone derived from the Lower Coal Measures, used for lining furnaces, is obtained for British use chiefly from the neighbourhood of Sheffield.

Fluorspar, mined in Derbyshire, is used in lead smelting and in the making of ferro-silicon and ferro-manganese.

Slate is less used than formerly for roofing but the waste, when finely powdered, is used in the making of bricks of great density and strength, also of pottery, green and amber coloured glass bottles and, above all, cement.

Monazite, a mineral used in the manufacture of incandescent gas mantles, is found in grains scattered among other rocks, but is commercially available only where the rock is in the form of sand, as in the state of Bahia (Brazil), in N. and S. Carolina, and Travancore. There are also promising deposits in southern Ceylon.

Building Stones. Building stones are widely quarried for local use but some have special characters which give them an international reputation. Amongst the latter are certain fine-grained limestones which split equally well in any direction and hence are called 'freestones.' The freestones or oolitic limestones of Bath and Portland in Britain are very famous. Certain granites are also very important and there is a considerable trade in marbles.

Road Metal. A stone suitable for use as road metal must be tough, must not be splintery, and must not when broken give much dust. Provided these qualities are present, local material is used. Various igneous rocks, especially basalts, are particularly good.

Cement and Lime. The burning of limestone for lime is an important industry but even greater is the manufacture of Portland cement from impure earthy limestones or from limestone mixed with mud or clay. The manufacture is more and more concentrated in large units.

COMMODITIES (*continued*)

IV. Manufactured Articles in which various Materials are used

LEATHER. Leather consists of the skins of animals prepared in various ways. Its manufacture has given rise to an extensive commerce in articles of different kinds: first, in the hides and skins which form the raw material; second, in the substances used in treating this raw material; and third, in the manufactured product—leather, and articles made from leather. **Hides** and **skins** are derived from a great variety of animals. The great majority of the larger mammals whose skins are not of more value for furs contribute to it more or less. Even the skin of some animals outside the class of the mammals—for example, the python and the crocodile—is likewise employed for such purposes as ladies' shoes and bags. But the animals which furnish by far the largest proportion of the hides and skins of commerce are the domesticated species—the **horse, ox, sheep, goat,** and **pig**—which are kept in such large numbers wherever men are found above the lowest stage of barbarism. Formerly, British India furnished the United Kingdom with its chief supply of hides as well as large quantities of goat-skins, but now this trade is mainly replaced by imports of leather from that country, and though India is still an important source of raw hides the Argentine Republic and Italy supply far more. Goat-skins are largely obtained also from South Africa and other (chiefly Mediterranean) countries, while sheep-skins are naturally obtained in greatest numbers from the same countries as those from which we draw our wool—Australia, New Zealand, South Africa, and the Argentine Republic. Hides are preserved for and during transport either by being steeped in brine, and are hence called wet, or by some process of drying. The raw hides from India and South Africa are mostly dry, those from America and Australia wet.

Tanning is the principal process resorted to in converting hides into leather. It consists in saturating the hides, after some preliminary cleaning and dressing, with a solution which alters the chemical character of one of the constituents of the hide, and renders the hide firm and durable. Nearly always this solution is derived from some vegetable substance, the bark or some other portion of a

tree or other plant, which yields the necessary principle called tannin, or tannic acid, a very powerful astringent. Substances containing this principle have been discovered to exist in the native vegetation of almost all parts of the world, and the discovery of the art of making leather by means of them was very early made, and appears to have been made independently in many different regions. The processes of tanning are represented on the oldest Egyptian monuments, and the North American Indians knew how to make a pliant and excellent leather before the discovery of America by Europeans. Nevertheless, the art was unknown to the native inhabitants throughout a large part of central Africa south of the Sudan.

Till nearly the middle of last century oak-bark was the agent almost exclusively employed in tanning in Great Britain ; now it is only one out of fifty or more competitors, and there is a large import of various tanning-substances from many parts of the globe. Among the chief are barks, gambier, myrobalans, sumach, and valonia. Under the heading bark are included not only different kinds of oak-bark, larch-bark, and others, which, besides being produced at home, are largely imported from the mainland of Europe, but also others imported from elsewhere. The bark from the United States is chiefly that of the hemlock spruce, the principal tanning agent both there and in Canada. In both countries, however, bark from native oaks is used for the best leather. The leading tans now imported into Great Britain are chestnut extract and quebracho extract. An important source of tanning-bark brought to this country is Natal, where it is derived from various species of acacia, the best being that of the *Acacia pycnantha*, Benth., or black wattle (introduced from Australia)—a bark that yields nearly a third of its weight of tannin, and the *A. mollissima*, Willd. To save carriage there is a growing tendency to prepare tanning extracts from the bark before exportation.

Gambier is extracted from the leaves of a shrub (*Uncaria Gambier*, Roxb.) belonging botanically to the Cinchona family, a native of the Malay Peninsula and the Eastern Archipelago, and is imported from Singapore. It is also used in dyeing, and in China is much used for chewing, along with betel-nut. Having the tannin concentrated by the process of extraction, one ton of gambier will go as far as six tons of oak-bark in tanning.

Myrobalans are the principal of the numerous substances used in India for tanning. They are the fruits chiefly of two species of trees of the genus *Terminalia* abundant in Indian forests. **Sumach** consists of the powdered leaves and young twigs chiefly of one species of shrub (*Rhus coriaria*, L.), and is imported from the Mediterranean. and above all from Sicily, where the best quality is cultivated. **Valonia** is the name given to the acorn-cups of a species of oak which grows in Turkey. It is imported mainly from Smyrna, and is used

in dyeing as well as tanning. Of other vegetable substances used for tanning the best known perhaps is **divi-divi**, which consists of the twisted pods of a leguminous tree known as *Cæsalpinia coriaria*, Willd., a native of South America. In recent years there has been an export from the Argentine Republic of extract of the wood of the quebracho (*Aspidosperma Quebracho*, Schlecht.), and of the wood itself for the rapid tanning of cheap leather. The tree is a native of the forests of the Parana-Paraguay basin.

Attempts to tan with mineral substances were made for about a hundred years before the successful development of 'chrome tanning' with compounds of chromium. Chrome-dressed kids are now a regular manufacture.

For certain purposes skins are made into leather without tanning. A soft flexible kind of leather suitable for gloves, &c., is made by a process called **tawing**, in which alum and other salts are the principal substances employed. **Wash-leather**, or chamois leather, is made by working oil into the cleaned skins. **Morocco leather** when genuine is made from goatskin, is always coloured on one side, and on that side has the well-known roughened surface imparted to it by means of a stamp, generally of boxwood. It takes its name from the country where it was first made, or through which it was first introduced into Europe. According to some accounts what was first known as Morocco leather was really leather manufactured in Kano, in Northern Nigeria. By the Moors it was introduced into Spain, where Cordova and other Moorish cities acquired celebrity in connection with this product, so that the name of cordova leather or cordwain came to be applied as a general term for Spanish goatskin leather. About the middle of the eighteenth century the manufacture was introduced into Alsace, and since then it has been carried to all other industrial countries, and it has consequently declined in Spain, which for centuries supplied fancy leathers to all Europe. Russia leather is distinguished by its peculiar odour, which has this advantage, that it is so disagreeable to insects that the presence of a few books bound in this leather in a bookcase is said to be enough to preserve the other volumes from their attacks. The odour is due either to the leather being tanned with the bark of the Russian birch, or to its being treated with a kind of oil made from the bark or the bark and roots of that tree. This kind of leather is still a speciality of the Russian leather industry.

The European countries in which the manufacture of articles from leather is most highly developed are Germany, France, and the United Kingdom. Coloured leathers are the speciality for which Germany is chiefly noted in this branch of industry. France stands pre-eminent in its glove manufacture and is also noted for its lacquered or patent leather, a product which was first made in that country about the middle of the eighteenth century. Of the British

exports of leather manufactures, the most important, next after boots and shoes, are saddlery and harness (made chiefly from pigskin), these being goods for which British leather manufacturers have a high reputation. The United States, as is natural in the case of a country which has such a vast area devoted to the rearing of domestic animals to draw upon for the raw material, has a very large industry in leather and vast native supplies of tanning bark.

PAPER. Paper is made chiefly from vegetable fibre reduced in water to a pulp so fine that the particles of fibre can scarcely be felt. Nowadays a certain proportion of China clay is often added to the pulp, and, when not in excess, it improves the inferior qualities of paper. The pulp after being bleached by means of chloride of lime, is ready for paper-making, and for this purpose is kept by constant stirring as nearly as possible of an equal consistency throughout. When the paper is made by hand, as some of the best kinds still are, a frame called a mould, consisting of a piece of fine wire gauze bordered by a raised rim, is introduced into the pulp by a workman, who, with the aid of another light frame, withdraws as much of the pulp as is necessary to make a sheet of paper. The water quickly drains through the wire gauze, leaving the vegetable fibres to form a thin moist film. This film when dried by various processes forms paper; not, however, paper that can be written on, but that soft porous kind which is used as blotting- or filtering-paper. To be made capable of receiving ink without allowing it to run it must be immersed in size (the essential ingredients in which are rosin and alum), and various other operations are necessary before writing- or printing-papers have the appearance and finish that belong to them when sold.

Machinery for paper-making was first used with success early in the eighteenth century. All such machines consist in contrivances for feeding a supply of paper-pulp equally to a revolving endless band or apron of fine wire gauze, and passing it thence to a similar apron of felt or flannel, and afterwards to pressing-rollers, &c. So perfect is the machinery used nowadays, that from pulp constantly supplied to the machine a continuous roll of paper of any length (sometimes miles long) can be delivered from it in a finished state, either entire or cut up into sheets. The printing of newspapers is now done to a very large extent on the uncut roll. A large paper-making establishment on the Thames claims to have taken pulp from a steamer, made it into paper, despatched the paper to London, and had it returned to the mills as a book within four hours.

In the manufacturing countries of Europe and America the vegetable fibrê for paper-making is very largely used in the form of wood-pulp, made from soft-wooded trees, that being the form in which the most plentiful supply can be obtained cheapest. The best kinds of paper, at least in Western countries, are still made

from linen rags; but the supply of these is totally inadequate to meet the requirements of paper-makers, and hence not only cotton but also woollen rags are likewise employed, and vegetable fibres are now largely used in other forms. A kind of grass called esparto or alfa, which covers immense areas in the arid regions of southern Spain and northern Africa, from Tripoli westwards, is also imported into Great Britain for paper-making. Of late years, esparto has been largely displaced as a paper-making material by wood-pulp, whilst linen and cotton rags have constituted less than 1 per cent. of the total paper-making materials imported into Britain, compared with over 85 per cent. of wood-pulp. Two main types of wood-pulp are distinguished: mechanical wood-pulp, made by simply grinding down the wood-fibre chiefly of spruces, pines, and poplars, and chemical wood-pulp, made from the same woods by one or other of two different processes, in one of which soda is the chief agent, and in the other sulphurous acid along with either lime or magnesia. The mechanical pulp is inferior and used only in making cheap papers such as 'newsprint' on which newspapers are printed. The making of wood-pulp is carried on mainly where there is abundance of the raw material along with water-power. Into the United Kingdom wood-pulp is imported chiefly from Norway and Sweden, Finland, Canada, and Germany. The refuse of jute manufactures likewise affords an important material for this industry, which can also utilise directly a whole host of vegetable fibres, some of which—for example, the bast fibres of the baobab—are of great value for special purposes, such as the making of paper for bank-notes. In China and Japan, where the paper-makers excel the best European workmen in the making of some very delicate but strong papers, the material chiefly used is the inner bark of a tree known as the paper mulberry (*Broussonetia papyrifera*, Vent.), the leaves of which can be used in feeding silkworms. The strength of this paper is due to the fact that in making the pulp the long bast-cells are not broken and torn as in European pulping-machines, but merely softened and separated by beating. In taking up the pulp in the mould the cells are made to lie in one direction, and the paper may be strengthened by taking one or more additional dips, in which the cells are made to lie in other directions. Gums are used to make the cells of the pulp adhere. Thick papers are made capable of being used for many of the purposes of leather. The Japanese also make a very strong kind of paper from seaweed.

When we consider the immense consumption of paper in forms with which everyone is familiar, and the great variety of the purposes to which paper is now applied, we can realise to some extent the importance of this invention in the history of mankind. It has often been pointed out that, without some cheap material with which to make books, the invention of printing would have been almost

fruitless. The history of the art of paper-making is therefore of peculiar interest. Parchment and papyrus rolls were the ancient substitutes for paper. The latter were made by causing the thin inner skins found at the bottom of the stems of a kind of rush which grows in the Egyptian delta to adhere together at their edges. The process is obviously a laborious one, so that the roll could not but be costly, yet Egypt carried on a large and lucrative trade in this article, and vast thickets of papyrus grew where there are now fields of cotton, maize, rice, &c.

The art of paper-making does not seem to have been discovered independently in the West. From China it spread into central Asia, and a paper-factory was established at Samarkand early in the eighth century A.D., when that town was in the hands of the Arabs. By the Arabs it was introduced into Spain, and it is certain that linen rags had come to be used for the purpose before the close of the twelfth century. It was probably for this reason that a small district situated to the south of Valencia in Spain, which had been celebrated in Roman times for its flax, was equally celebrated in the twelfth century for the excellence of its paper, which was exported thence both to the East and to the West. The art, if not first practised, was at least first firmly established in England in 1588, when a paper-mill was erected at Dartford in Kent, which county had always been noted for its excellence in this branch of industry. Into Scotland, where it is chiefly carried on in the counties of Mid and East Lothian, it was not introduced till near the close of the seventeenth century. Everywhere this industry is carried on, as might be expected, by the side of rivers or streams, which supply the water required for making and washing the pulp, and not far from great consuming centres. Wood-pulp is also bulky, so that cheap papers are made in mills by the side of navigable waterways, such as the lower Thames, where the raw material can be received direct from steamers. The availability of cheap power is another important factor.

Among European countries, the United Kingdom and Germany are the two rivals in the consumption of paper relatively to population, both of these countries being estimated before the War to use upwards of 13 lbs. of paper per head in a year; whereas France, which comes next, was estimated to consume less than 10 lbs.

In the consumption of paper relatively to population the United States are far ahead of even Great Britain and Germany, which is no doubt chiefly due to the wide circulation of newspapers in that country. To meet this large consumption there is not only an extensive native industry, supported to a large extent (as might be expected) by the importation of pulp, but also a large import of manufactured paper. The United States now absorb annually about four-fifths of Canada's exports of pulp-wood, pulp, and paper;

about two-thirds of their newspapers are said to be printed on paper made from Canadian materials. From 1910 to 1924 Canada's consumption of wood for pulping rose from 75 to 400 million cubic feet ; from 1924 to 1929 the consumption was doubled and has since grown steadily.

Paper factories on the European model have been erected in the principal countries of eastern Asia, and in India those set up in the neighbourhood of Calcutta and Bombay have already almost extinguished the hand-made paper, strong though coarse, once largely made by the Mohammedans of that country. The manufacture of paper both of Japanese and European types is an important industry in Japan.

During the War Germany developed a large manufacture of paper yarn and cloth, and the cloth made of this material was said to be washable, sewable, soft, porous, and warm.

EARTHENWARE AND PORCELAIN. The simplest form of manufactured article made from earth, or rather from clay, is a brick dried in the sun, and we may be sure that this is one of the earliest of human inventions. Bricks of this kind are still made in Egypt and other parts of the Old World where fuel is scarce and sun-heat by day quite or nearly constant, and also in those parts of the New World which have a similar climate, being known in the latter regions, which were formerly to a large extent under Spanish rule, by the Spanish name of adobes. It was but a small step to the burning of bricks by artificial heat. The potter's wheel, by means of which mere steadiness of hand enables a workman to mould moist clay into a perfectly round form, is likewise an invention of great simplicity and great antiquity, though unknown, like every other form of wheel, in the New World before the time of Columbus. The method of glazing pottery is a less obvious discovery, and must have been due, like a host of other inventions, to some fortunate accident. The oldest specimens of earthenware that have come down to us are unglazed. Yet the art of glazing was known to the ancient Assyrians, Egyptians, and Etruscans, all of whom are noted among the nations of antiquity for their productions in pottery. Improvements in the potter's art were made by the Arabs during the period of their highest civilisation. By them the making of painted earthenware with a finely glazed or enamelled surface seems to have been practised before it was known to any European people. But the finest of all kinds of earthenware, the kind known as porcelain, was originally a Chinese invention, referred by Chinese chroniclers to the time of a dynasty which reigned in China from the second century B.C. to the first A.D. In Europe, however, this earthenware was unknown till the thirteenth century, and does not seem to have become widely known till it was introduced by the Portuguese about 1500, which accounts for the fact that the name of porcelain (together

with its equivalents in other European languages) is one of Portuguese origin. It was two hundred years later still before the art of making porcelain became known in Europe, where it was discovered independently. An inferior kind of porcelain was made at St. Cloud in 1695, but the true or hard porcelain, as it is called, was first made about 1709 by a German alchemist of the name of Böttcher, who discovered it to be the product of a mixture of sand with kaolin or china clay, a fine kind of clay resulting from weakening or alteration of granite. Immediately after this discovery a porcelain factory was set up at Meissen in Saxony, where it is continued to the present day. Efforts were made to keep the art secret, but it gradually spread to other countries, and is now carried on in all countries which have a highly developed manufacturing industry.

For the manufacture of ordinary pottery many kinds of clay will suffice provided that they are free from iron, which causes the clay to fuse during the process of baking. Other ingredients are also used, such as burnt and powdered flint and phosphate of lime, the latter often in the form of bone-ash. The decorations on ordinary pottery are painted on the unglazed ware, and are afterwards protected by a glaze composed of various ingredients fused together by a second baking. The glaze on porcelain is merely a thin coating of glass, and the painting is added on the glaze by means of pigments composed of finely powdered coloured glass, after which the articles in this case also are again put into a kiln to be fired. An unglazed kind of earthenware under the name of terra cotta is moulded into statuary and other kinds of ornamental articles, and unglazed pottery is extensively used in the south of Europe, in Africa, and Asia.

In England the manufacture of earthenware remained in a backward condition till after the middle of the eighteenth century. Its chief seat was Burslem, in north Staffordshire, a place well suited for this branch of manufacture on account of the great variety of clays found round about it, as well as the abundance of coal in the vicinity. It is important that among the clays of this district (' the Potteries ') is a great abundance of the coarse clay used in making the saggars or seggars in which the earthenware is baked. The presence of these two heavy materials, coal and coarse clay, accounts for the fact that this still continues to be the centre of the English manufacture of earthenware and porcelain, now that this branch of industry has attained greater dimensions in England than in any other country in the Western world, and clays, flints, and other raw materials have to be brought to the district from more or less distant parts. The finer kinds of kaolin for the manufacture are obtained (in the British Isles) solely in Cornwall and Devon, but are worked up into porcelain in Staffordshire, because it is cheaper

to send kaolin to the Potteries, where there is abundance of coal and most of the other materials required for the purpose, than to bring the coal and other materials to the districts that furnish the kaolin.

The first great improvements in English pottery were due to Wedgwood, who was born at Burslem in 1730, and since his day the art has been brought in this country to such perfection that the best English varieties of earthenware are unsurpassed if not unrivalled by those of any other part of the world. Besides the products of the Potteries, in the local sense of that word, England is noted for its ornamental stoneware (the hardest and heaviest kind of earthenware) made chiefly in London (Lambeth). In recent years there has been a great development in the use of glazed tile—in bathrooms, &c. About 1885 the United Kingdom exported earthenware and porcelain to the value of three or four times the value of its import, the exports being sent chiefly to the United States, the Australasian Colonies, and British North America. At the beginning of the twentieth century the value of the British export was only about twice that of the import, a change chiefly due to the growth of the imports. The imports now are about two-thirds the value of the exports. Canada, Australia, the Argentine Republic, and Brazil were in 1913 our chief external markets. In the United States the home industry developed rapidly under the protection of duties varying till recently from 20 per cent. to 60 per cent. *ad valorem.*

Next to the United Kingdom Germany has the largest industry of this kind as well as the largest export, and France comes third. Formerly Meissen, in Saxony (' Dresden China '), and Sèvres, near Paris, vied with one another in producing the most beautiful coloured porcelains known, but English porcelain now has a place in the first rank.

In the East, China is still noted for its porcelain, which it exports to a considerable amount (chiefly from Amoy) ; and so likewise is Japan, into which the art was introduced from China. Japan has developed a great export trade in cheap china.

It may be noted in conclusion that hardly any other branch of industry has so many names relating to the geography and history of the art in general use in connection with it. In English porcelain is very commonly known by the appropriate name of china-ware, and kaolin as china clay. The name of majolica was given by the Italians to painted and enamelled earthenware which they appear first to have become acquainted with as a product of the island of Majorca, and from the Italian has been adapted into English. Faience is a name for the same kind of ware derived from the Italian town of Faenza, where it was first made in Italy. Delft is the name of another kind of painted and enamelled ware first made at the town of that name in Holland, and painted blocks of this kind of ware are generally known as Dutch tiles.

GLASS is a substance made by melting together various ingredients, of which silica is always the chief, and is the only one that enters into the composition of all kinds of glass. Silica is one of the most widely diffused substances in nature, and is found in various forms, quartz (the main constituent of most sands) and flint being the most familiar. Most commonly sands are impure, discoloured, it may be, by iron, or mixed with lime or other ingredients; but sometimes they consist of nothing but silica, and such pure sand or sandstones afford the best material for glass-making, the sandstones being first crushed. In England various deposits of sand, at King's Lynn in Norfolk, at Hastings, and Leighton Buzzard, have in turn been noted for the excellence of the material which they afforded for glass-making. In France the most famous deposits employed for the purpose are the sandstones of Fontainebleau, but at the present day the United States claim to possess, in the west of Massachusetts and elsewhere, the finest of all glass-sands.

Along with silica there is always fused in the making of glass some alkaline substance, either soda or potash. Glass made solely from soda is found in course of time to be perishable, and hence, in the making of most kinds of modern glass, lime is added to render the glass more lasting. Soda is chiefly used in the form of carbonate of soda and sulphate of soda, which are largely manufactured for the purpose; but for making some of the commoner sorts of glass, as bottle-glass, common salt is sometimes employed. Potash is generally used in the form of carbonate of potash (the pearl-ash of commerce), sometimes in that of nitrate of potash or saltpetre. The glass made from potash is the freest from any tinge of colour, but that made from carbonate of soda, besides being nearly colourless when the other ingredients are pure, is easier to work in the state of partial fusion in which glass is usually treated. For ordinary purposes, accordingly, this substance is preferred. Potash is used either with or without lime in the manufacture of some of the best kinds of glass, such as Bohemian glass and English flint glass (crystal). In making this last kind of glass, lead (generally in the form of red lead) is used instead of lime, rendering the glass softer and more fusible and lustrous. The use of lead is an English invention of the eighteenth century. Besides these ingredients various others are used for special purposes, as to remove colours [1] which some impurities in the materials employed in making the glass might impart, or to give colours desired to coloured glass. In the making of bottle-glass, the colour of which is an unimportant consideration, very varied ingredients may be employed. In Germany some kinds of rock, such as basalts, trachytes, granites, &c., which contain a certain quantity of soda and potash along with from

[1] For this purpose manganese is chiefly used, but when in excess this substance itself imparts an amethyst hue to the glass.

65 to 75 per cent. of silica, and are easily fusible, have been employed with success in glass-making.

In the process of manufacture glass, after the fusion of the materials, is worked at a high temperature, which maintains it in a soft and somewhat pasty condition, and it is frequently re-heated. The implement chiefly used in the manufacture is the blow-pipe, by means of which balls of the glass paste are blown out into hollow forms. To make bottles and similar articles, almost all that is necessary is to blow the glass in moulds of the proper shape. When flat sheets are required, different methods of making it from blown glass are employed. By the old method a ball of blown glass was twirled round and round without blowing till it spread out flat except at the middle (the bull's eye). By another it is blown and twirled into a long cylinder, which is then cut on one side longitudinally and laid flat. Only the best kind of glass, made from the most carefully selected materials, is capable of being rolled out into sheets by means of steel rollers. Glass so made is called plate-glass. Flint-glass is the kind best adapted for being cut and engraved in the cold state. Under the name of Jena glass a very fine kind of glass used for scientific purposes was made exclusively in Germany, but since the War efforts have been made in this and other countries to deprive Germany of that monopoly. In the glass industry automatic and semi-automatic machinery is now extensively employed.

All kinds of glass before being ready for use have to be annealed, or to undergo some equivalent process for enabling them to stand ordinary usage at ordinary temperatures. If suddenly removed from the temperature of the glass-works into the open air, they would be so fragile as to break at the slightest shock. The process of annealing consists in cooling them slowly and equally, so that no difference of strain in different parts of the glass is brought about by differences of temperature. Since 1875 different processes of making hardened or toughened glass have been tried, and hard cast glass has been made in forms suitable for railway sleepers, tramway rails, grindstones, and floor-plates, the glass so treated being run into moulds made of a mixture which becomes heated and conducts heat at the same rate as glass. By using potash or soda in excess, a kind of glass can be made which is soluble in water, and is used among other purposes as a protective coating against the action of the weather on calcareous building stones where, combining with the calcium salts, it forms an insoluble compound. Various types of unbreakable and safety glass are now made, often by a number of thin sheets being united by some tough transparent cement.

The invention of glass took place in prehistoric times. It was known at a very early period in Egypt, but the oldest piece of transparent white glass of which the date is known is a vase found

among the ruins of Nineveh and now preserved in the British Museum. It has inscribed upon it the name of Sargon, an Assyrian king who reigned about the close of the eighth century B.C. In ancient times the Egyptians and Phœnicians were the two peoples most noted for their glass-making, for which both Egypt and Phœnicia supplied excellent sand, the former near Alexandria, the latter in the bed of the small river Belus (now the Naman), which enters the sea near Acre. The alkali in Egypt was obtained from the Natron (soda) Lakes situated to the west of the delta. In Italy the making of glass does not seem to have been practised till about the beginning of the Christian era, and there is no positive evidence of window-glass having been used there before the third century A.D. In modern times the Venetians first acquired celebrity for the beauty of their glass manufactures, the art having been practised there in some form or other from a date not long subsequent to the foundation of the city. Glass-making is now pursued on or near all the most productive coal-fields. Belgium, which has local supplies of sand as well as coal, and manufactures soda compounds from imported materials, is the headquarters of window-glass manufacture in Europe, and also makes excellent mirror-glass. Czechoslovakia has also a large glass industry.

SOAP as a commercial product is a chemical compound resulting from the action of soda or potash on various fatty or oily substances, and hence, besides being an important commodity (unknown to the ancients) in its manufactured state, is the cause of a large trade in the various fats and oils that enter into its composition, as well as in the alkalies mentioned. Hard soaps are those made with soda ; soft, those made with potash. Glycerine is a by-product of the soap manufacture. The fatty substances principally used in the manufacture of soap in the United Kingdom are tallow, coco-nut oil, cotton-seed oil, palm-oil, and other vegetable oils. In the south of Europe the staple ingredient of this nature is olive-oil, along with which are now used, in addition to the vegetable oils just mentioned, ground-nut oil, oil of sesame, and a great number of others. Even the grease from sheep's wool can now be employed in this industry.

CHEMICAL INDUSTRIES. Of these only the most important can here be noticed, and only so far as to explain the large consumption of certain commodities. Details as to processes must be sought for in works on chemistry.

Alkali. The commodities known as alkali represent perhaps the largest of all such industries—namely, those concerned with the preparation of carbonate of soda and caustic soda, which are chiefly used in the manufacture of glass and soap. As usually made in Great Britain by the process known as the Leblanc process (patented in France in 1794), the materials employed are common salt, carbonate of lime (generally in the form of limestone), coal, and

sulphuric acid. Common salt is in chemical language chloride of sodium—that is, a compound of the metal sodium with chlorine, which when free is a gas; and in order to be converted into carbonate of soda, the sodium, or rather the oxide of sodium, has to be brought into combination with carbonic acid. This union is effected by different stages. First, sulphuric acid is made to act on the common salt, by means of which sulphate of soda or salt cake and hydrochloric acid are obtained, the latter passing off as a gas. Next, the sulphate of soda is converted into carbonate of soda, and in this stage the burning of coal or the heating of carbonate of lime is necessary to furnish the carbonic acid. The product obtained is an impure carbonate of soda which is known as black ash and is sufficiently good for use in soap-making; but for the making of glass and some other purposes the carbonate of soda has to be purified. In the process of soap-making black ash is converted into caustic soda (a compound containing no carbonic acid) by treatment with quicklime.

This process or series of processes is now to a large extent superseded by another, called the Solvay process, in which common salt is converted into carbonate of soda by means of the carbonate of ammonium. A solution of ammonia is mixed with the salt, and carbonic acid then passed in as a gas. A further process enables the ammonia to be recovered and used over again. This method of making carbonate of soda is simpler than the first, and yields a soda highly valued by glass-makers for its purity. Before the War it was very largely practised in Germany, to the injury of the older alkali manufacture of the United Kingdom, but the post-War reorganisation of the British chemical industry by Imperial Chemical Industries, Limited, has entirely altered this position.

Potash, another of the alkalies largely used in the manufacture of glass and soap, as well as a number of other chemical industries, besides forming a valuable manure, was formerly mostly made by the burning of vegetable matter, and the chief exporting countries were Canada, Russia, and other timber-producing countries. In France it has long been made from the grease of wool, which was largely a waste product. After the discovery of the great deposits of potassic salts in central Germany, however, that country became the great source of supply. Subsequently, important deposits were discovered in the south of Alsace and in the north-east of Spain, near Cardona. During the War efforts were made in various countries to extract it from different raw materials as from minerals containing felspar. In the United States a variety of glauconite, occurring in a narrow strip in the states of Delaware and New Jersey, proved a source. Ferrocyanide of potassium is now an important by-product of the illuminating gas industry, being used either alone or along with potassium carbonate as the raw material in

the manufacture of cyanide of potassium, which since 1890 has been more and more employed in the extraction of gold, either as a substitute for, or as a supplement to, the amalgamation process.

Sulphuric acid, which is employed in a great many industrial operations, but most largely in the manufacture of soda as above described, is chiefly made on a commercial scale from nitrate of soda and sulphur or iron pyrites, which is a compound of iron (often with more or less copper) and sulphur. The sulphur or iron pyrites is burned, and the resulting vapour acted upon (in leaden chambers) by nitric acid vapours obtained from the nitrate of soda, which is heated along with a quantity of the very acid (sulphuric) which the subsequent operations are intended to produce. Arrangements are made for recovering the nitric acid so that it can be used over again with little waste. Nitrate of potash (saltpetre) may be used instead of nitrate of soda, cheapness being the ground for preference. In more recent processes of manufacture, which are cheaper for the preparation of the very strong acids required in the coal-tar colour industries, and are now said to be cheap enough even for the more ordinary forms of the acid, the nitrates are not employed, but are replaced by platinum, in the presence of which the dioxide of sulphur is by a catalytic action more highly oxygenated through combination with the oxygen of water in the form of steam.

Bleaching Powder. The hydrochloric acid obtained in the first stage of the manufacture of carbonate of soda by the Leblanc process (see above) is utilised in the manufacture of bleaching powder, which is a compound of chlorine and lime. Manganese, in the form of the black oxide of manganese, is employed to free the chlorine from the hydrochloric acid, and the chlorine is then passed into chambers containing powdered slaked lime. Arrangements are made for recovering the manganese used in this process so as to use it again.

Sulphate of ammonia, a valuable nitrogenous manure, is one of the by-products of the destructive distillation of coal in gas-making, of the shale-oil industry, and the manufacture of aluminium (see also below). Another important by-product of the same industry is **coal-tar**, which was at one time applied only to the same purposes as wood-tar, preserving ropes, timber, &c., but now yields an infinite variety of products of use in the arts. Some of these are employed to an enormous extent in the making of dyes of almost every hue. The first dye made from a substance extracted from coal-tar was a violet shade to which the name of mauve was given. It was accidentally discovered in 1856 by Dr. W. H. Perkin, in the course of an investigation made with a different purpose, and was at once applied industrially in the celebrated dye-works of Messrs. Pullar at Perth. Soon other shades of a similar origin were

discovered, and now almost all shades can be imparted to fabrics by means of dyes extracted from one or other of the products of coal-tar. At first this branch of industry was mainly carried on in Great Britain, the land of its birth, and the country most abundantly supplied with the raw material ; later the chief seat of the industry was transferred to Germany. Probably there is no industry whose geographical distribution has been so much affected by the War as this. About 1885 it was estimated that Germany produced on an average about six times the quantity of dyes from coal-tar produced in the United Kingdom ; and what is still more striking, Germany derived from Great Britain a large proportion of the principal coal-tar products required as raw materials for the production of these dyes. The War inevitably imparted a great stimulus to the development of this industry in countries outside of Germany. As the materials used in it are largely the same as those used in the manufacture of high explosives, the industry is considered vital to the interests of this country, and under an Act which came into operation on January 15, 1921, the import of synthetic organic dyestuffs and their raw materials was for a period of ten years allowed only under licence of the Board of Trade. Still more rigorous protective measures were adopted in the United States. The results are seen in the following figures. Import into the United Kingdom of coal-tar dyestuffs in 1913, 367,884 cwts., in 1929, 52,554 ; production of those dyestuffs, United States, in 1914, 5,909 cwts., in 1930, 773,000 cwts. (dyes only), 1,170,000 cwts. (coal-tar products). In 1926 an important combine of dye and other chemical producing companies was formed in Great Britain under the title of Imperial Chemical Industries, Limited.

Alum, which is largely used in the sizing of paper, dyeing, calico-printing, painting and the preparation of colours, the tawing of leather and other industries, is prepared by several processes from clay or slate. In former days it was relatively much more important in the dyeing industry than now, on which account it had a very prominent place in the commerce of the Middle Ages.

Carbide. Since 1892 an important industry has sprung up by the discovery in that year (almost simultaneously by Wilson in America and Moisan in France) that the carbide of calcium is formed when lime and carbon are fused together at the temperature of the electric furnace. It then became possible to manufacture cheaply the powerful illuminant acetylene gas, a compound of carbon and hydrogen which is formed by the action of water on calcium carbide. The carbon is mixed with the lime in the form of coke of the utmost attainable purity. The manufacture is carried on in Norway and Switzerland, though from these countries the great bulk of the product has to be exported, as well as in the United States, France, Italy, and Austria, in all of which there is a large consumption.

The development of electricity has, however, rendered the consumption much smaller.

Artificial Silk. Another important chemical industry of recent years is the manufacture of artificial silks. These, like the silk of the silk-worm, are made from some form of wood-fibre or cellulose. By different processes a jelly is produced similar to the substance in the body of the silk caterpillar (p. 156), and this by equable air-pressure is forced through glass tubes with orifices so minute that, just as in the reeling of silk, from ten to twenty of the fine filaments thus formed are united to form a single thread of silk. The first establishment for the carrying on of this industry was erected at Besançon, near the forests of the Jura. Great improvements in processes have resulted in products of much better quality and a rapid development of the industry (see p. 231).

Oxygen, &c. Still more recent chemical industries are the commercial manufacture on a large scale of oxygen, nitrogen and nitrogen compounds, and hydrogen, and the extraction of radium from pitch-blende or uraninite. Oxygen is now largely manufactured for various medical, scientific, and engineering purposes. Nitrogen is obtained from the air for the production of various nitrogen compounds used as fertilisers. In the great chemical works at Ludwigshafen it is now directly combined with hydrogen to form ammonia. The production of calcium cyanamide or nitrolin is associated in Norway and elsewhere with the production of calcium carbide, which, when heated, absorbs nitrogen from the atmosphere, and in the same country water-power is made use of to manufacture nitrate of lime, nitrate of ammonia, and nitrite of soda. Hydrogen is now largely manufactured to harden oils for the preparation of margarine and to enable low grade oils to be used in the manufacture of soaps. In the process of 'hydrogenation' whereby coal is converted into oil (as at the Imperial Chemical works at Billingham-on-Tees) it is required in large quantities. The pitch-blende used for the manufacture of radium is mainly obtained from Joachimstal in Bohemia, and other places on both sides of the Erzgebirge, but England has one source of supply, at St. Just in Cornwall.

Alcohol has long been manufactured in Germany and elsewhere for industrial purposes, chiefly from potatoes, but the development of the industry has been retarded in this country by fiscal regulations. The bulk of the raw material used as compared with that of the product favours the establishment of the factories in the agricultural districts. In colder countries peat seems likely to furnish on a large scale material for the same industry.

EUROPE

Europe, the smallest of the continents, is, taken as a whole, the most densely peopled. In considering this superior density of population we must take into account the size of the continent, its situation and outline, and its history.

The difference in the size of Europe as compared with Asia makes it impossible for it to have such vast tracts as the latter continent, remote from the sources of moisture, the essential condition of fertility and cultivation, or rendered unfit for cultivation by the duration and the rigour of frost. The situation and outline of the continent are peculiarly favourable to its climate. The whole area, except a small fraction in the north, lies within the temperate zone, and the great irregularity of its outline causes it to enjoy in a higher degree than any other continent the mitigating effects of the sea on extremes of heat and cold. Its westerly situation is of even greater importance in this respect, and its southern peninsulas have a peculiarly warm and equable climate, not only in consequence of the moderating effect of the Mediterranean Sea on the temperature, but also because these peninsulas are to a large extent protected from cold northerly winds by mountain-barriers on the north.

In temperate Europe there is the same increase in extremes of temperature from west to east as in other parts of the north temperate zone, and this is true to a certain extent even of the countries belonging to the Mediterranean region. Besides these peninsulas, or the greater part of them, nearly the whole of France and the British Isles, and the whole of Belgium and Holland, are outside of the area in which the mean daily temperature sinks below the freezing-point for at least one month in the year. On the other hand, the area in which the mean daily temperature is above 50° Fahr. for at least eight months in the year is almost confined to the Mediterranean region, although it includes also the west of France from about the Loire southwards. In the east of Russia the area in which there is at least one month with a mean daily temperature above 68° Fahr. extends as far north as the latitude of the Orkney Islands.

By far the greater part of the area of Europe has a sufficient rainfall for cultivation, so that south of the region in which the tem-

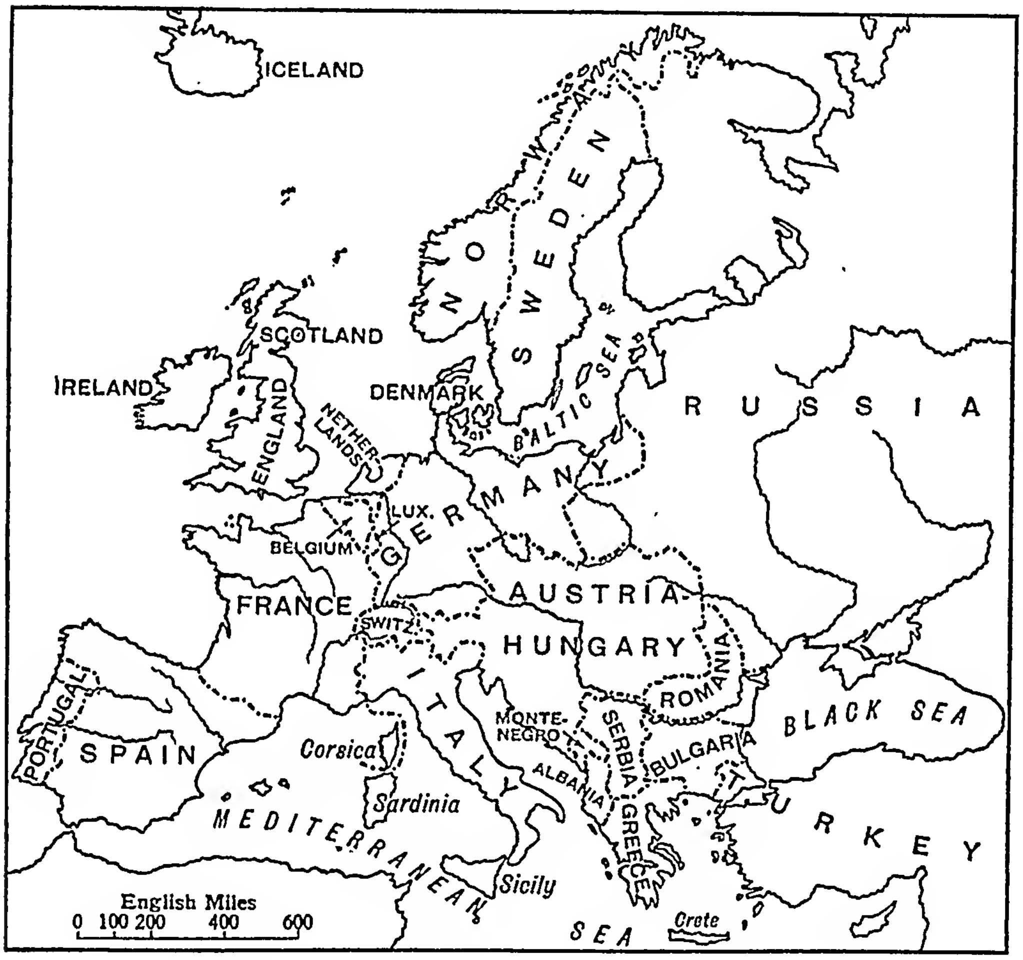
perature puts a limit on agriculture, almost the whole of the lowland area, and even in the far south land at the height of between two and three thousand feet, is capable of being tilled. The deficiency of rainfall prevents the pursuit of agriculture chiefly in the south-east of Russia and in the interior of Spain. But though the rainfall is thus generally distributed, and occurs everywhere more or less all the year round, it is most abundant at different places during different seasons. The west, and above all the north-west, is the region in which autumn rains prevail, the east that in which there is a predominance of summer rain, but the Mediterranean peninsulas are the only region in which there is a marked deficiency of rain during any particular season. There the rains are chiefly winter rains, and the middle of summer is remarkable for its drought, to the south of about 40° N. almost rainless. These winter rains are apt to be very violent and are blamed for the denudation of large areas, especially in the neighbourhood of some of the most populous sites of antiquity, where the needs of the population caused the mountain slopes to be stripped of their woods. It is thus clear that Europe embraces a number of the climatic regions described above on pp. 31–48.

The **Mediterranean** type is found in those lands round the Mediterranean Sea, but in the eastern Mediterranean there is a marked increase in winter cold and summer heat. The **North-West European** type is found as far east as Denmark and central Germany where, with at least one month below freezing, it gives place to the **Central European** type and then in central Russia to the **Eastern European** type. In southern Russia (with an outlier in the Hungarian Plain) is the **Mid-continent Grassland** type of great extremes and with a rainfall mainly in spring. This fades into a **Temperate desert** around the Caspian Sea. In northern Russia, Sweden, and Norway is the **Cold Temperate** type fading northwards into the **Tundra.**

The great fact in the history of Europe which helps to explain the high density of population in that continent is the long duration of its advancing civilisation, together with the remarkably rapid strides taken within the last hundred years in consequence of the great mechanical inventions which have taken place in Europe. In civilisation, however, this continent was preceded by Asia and northern Africa (Egypt). In the earliest glimpses that we get of the commerce between western Asia and southern Europe we find the latter region supplying only the produce of their herds and forests —hides, wool, wood, wild honey, cattle and sheep, besides male and female slaves; and the articles received in return are ready-made clothes, iron and other metal tools, weapons, images, boxes of bronze and vessels of glass. The commerce thus carried on by Asia with Europe seems in fact to have been not unlike that carried on partly

by Europeans, partly by Arabs, with the people of Africa at the present day.

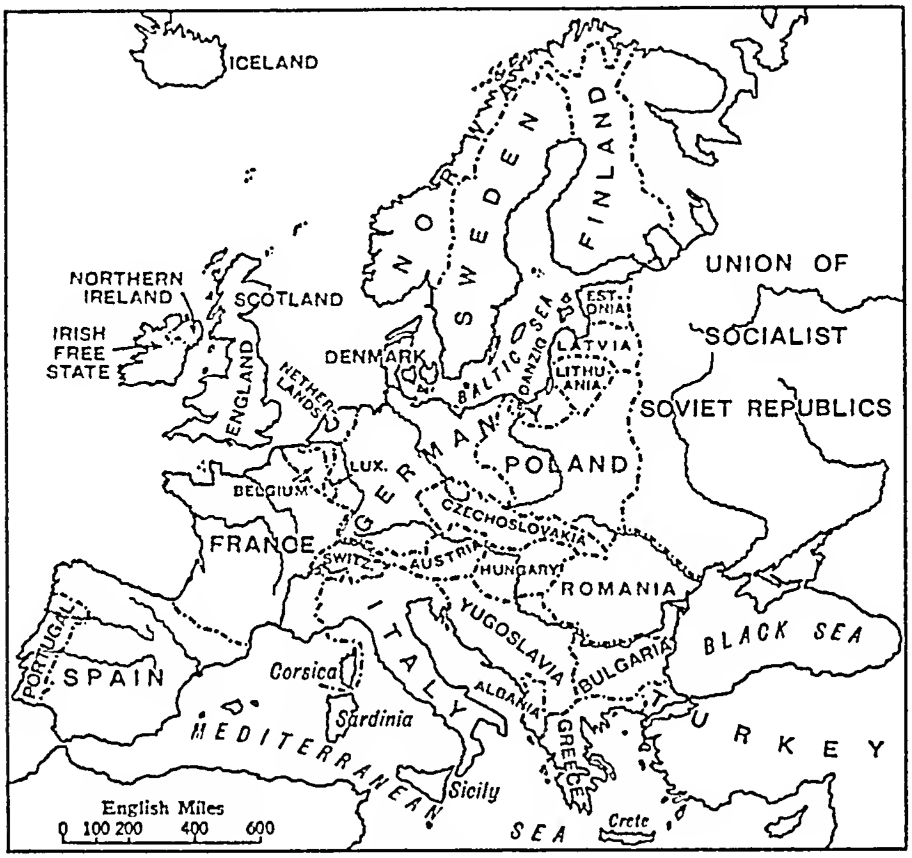
Many of the cultivated trees and plants now thoroughly characteristic of certain parts of Europe are known or appear to have been introduced into that continent within historic times. The olive, the cypress, and the laurel, the evergreens now so characteristic of the Mediterranean peninsulas, and so well adapted to stand the



Europe Political, 1913.

dry summers of that region, seem all to be of Asiatic origin, though introduced at a very early date. The olive grew in Crete at least as early as 1500 B.C., and by the seventh century B.C. it began to clothe the hills of Sicily. Of Oriental origin also is alfalfa or lucerne, the equally characteristic fodder-plant of that region, the deep-rooted ally of the clover which survives the driest summers, and hence has been introduced into many other parts of the world with a similar climate to the Mediterranean. From Asia also came the fig, mulberry, almond, walnut, chestnut, and apricot, all before the birth of Christ. The mulberry of the ancients, however, was

the black mulberry, the sycamine of the Greeks, the white mulberry being a much later arrival from the East. From Asia likewise came at various dates, mostly after the beginning of the Christian Era, rice, cotton, and several members of the orange genus (citrons, lemons, and oranges proper); and after the discovery of America agaves and cactuses, potatoes, maize, and tobacco were added to the vegetation and agriculture of this continent.



Europe Political, 1937.

The chief cereals of Europe, however, seem all to have been cultivated there in prehistoric times. Wheat and barley, as well as two kinds of millet, are proved by remains found beside the Lake-dwellings of Switzerland to have been cultivated in the later Stone Age; but the evidence of language would appear to show that many of our common cultivated plants, including cabbages, peas, vetches, parsley, and onions, were introduced into cultivation in central and northern Europe directly or indirectly from Italy.

At the present day Europe is to a larger extent a manufacturing region than any other continent, but the predominance of manu-

factures is characteristic only of certain countries. As is shown by the tables given with most of the countries, manufactured goods have a prominent place among the exports of native origin in the United Kingdom, France, Germany, Switzerland, and Belgium. In other European countries the chief exports are often still products of the soil, the forest, or the sea, but usually partially manufactured or prepared. One of the most important facts in the commercial history of the continent within recent years is the extent to which its agriculture has been affected by the rapid development of commerce in grain with many parts of the world in which wheat and other crops are produced under exceptionally favourable conditions.

Inland water-ways of Europe. The countries of northern Europe are separated from the countries of Mediterranean Europe by a great barrier of mountains—the Pyrenees, Alps, Carpathians and their associated smaller ranges and plateaus. Consequently the natural gaps through these mountains have always been of the utmost importance as affording routeways, whilst even the difficult passes of the Alps have assumed a special significance. Generally speaking, the climate of northern Europe with its well-distributed rainfall is such as to afford a constant supply of water to the rivers, and this factor, combined with the generally level character of the north European plain, has led to an extensive use of water-ways as highways of commerce. The rivers have been improved, in some cases canalised, and linked by canals so that the water-ways are specially significant in France, Belgium, Holland, Germany, Poland, and Russia. On the other hand, the rivers of the Mediterranean lands, owing partly to the seasonal character of the rainfall, are of less importance. The one great river, the Rhone, which flows into the Mediterranean from the north, has afforded a valley routeway of special note. Unfortunately, the great river of central Europe—the Danube—flows into an enclosed sea, the Black Sea, and loses thereby much of its value as a commercial highway. In the same way it is unfortunate for Russia that the great Volga should flow into a lake—the Caspian Sea.

Of international inland water-ways in Europe the most important is the Rhine, and next in importance in respect of volume of traffic are those connecting northern France with western Belgium. Among the canals that link up great rivers those which look most imposing on the map are perhaps the Ludwig's Canal connecting the Main and Danube, and the Rhone and Rhine Canal, but the traffic carried on both of these is quite insignificant. Much more important is the Rhine and Marne Canal, which carries considerable quantities of coal in both directions and some thousands of tons of iron ore from France into Germany.

The Danube itself is an important international water-way. It is navigable by steamers from Ulm downwards, and for barges of

1,000 tons from Ratisbon to Turn Severin, and from that point for sea-going vessels, a total length of upwards of 1,500 miles, but the navigation is subject to the drawback of interruption by fixed or floating ice for about two months in the year. But there is still more serious disadvantage in the character of its banks, especially below Budapest, these being so marshy as to afford comparatively few sites for towns. To these causes may, in a large measure, be ascribed the fact that in pre-War days the total tonnage of traffic at Vienna was less than one-tenth of that of the Seine at Paris.

Various projects for connections along routes that seem to offer the prospect of heavy, bulky traffic of the kind suited to inland water-ways are at present or have been at various times under consideration. But in general water-ways are decreasingly used, though Russia in particular has been active under the First and Second Five-Year Plans in linking her main rivers and has constructed the White Sea Canal to afford a direct link between the Baltic Sea (*via* Leningrad) and the White Sea.

Poland makes extensive use of the Vistula and its tributaries, but its value is lessened by the fact that the natural port at the mouth, that of Danzig, is not part of the state of Poland.

Amongst the water-ways of Germany the Elbe has a special significance in that it rises in Czechoslovakia and affords that state a direct water outlet to the North Sea.

Routeways linking Britain with continental Europe. The most important routes connecting England with the Continent, used for passengers, mails, and perishable and valuable goods, necessarily start from London, and are interrupted by the sea. The outports on the shortest sea-routes are Dover and Folkestone, connecting England with France by Calais and Boulogne respectively. The Dover-Calais route is shortest of all, being only 22 nautical miles as against 25 on the Folkestone-Boulogne route, but Boulogne has the advantage of being 27 statute miles nearer Paris. Dover also connects with Ostend (68 nautical miles) and by the train-ferry service, inaugurated in 1936, with Dunkerque. Other important outports are Harwich, from which steamers of the London and North-Eastern Railway run to Flushing (94 nautical miles), the Hook of Holland (the outport of Rotterdam, 101 nautical miles), and Esbjerg in Denmark (350 nautical miles) ; Newhaven, whence the Southern Railway (Central Section) runs steamers to Dieppe (76 miles) for Paris ; and Southampton, from which the Southern Railway (Western Section) runs steamers to Havre (122 miles), Cherbourg (98 miles), and St. Malo. There are other routes from Gravesend, Leith, Newcastle, and Hull to the Continent.

Railways of Europe. Fortunately the railways of Europe, except in Russia and the Iberian peninsula, are on the same gauge throughout, thus permitting trans-continental through running.

The gauge is the same as that in Britain though continental rolling stock cannot be used in this country owing to the narrowness of our tunnels and bridges.

Paris is the great focus for the routes touching the coast of France at all the ports from Calais to Havre, the railway distance to that centre being from Calais by Boulogne and Amiens 185 miles.

The influence of topography on railway routes is well seen in France, the main line to the Mediterranean running down the Rhone Valley east of the Central Plateau ; the main line to Spain running west of that same plateau. The Pyrenees long formed a barrier to railway communication between France and Spain and until 1912 no railway actually crossed the chain, the links between the two countries being round the eastern and western ends.

The stupendous engineering feats necessary to surmount the obstacles afforded by the Alps are well known and reference will be made later to the main routes.

What is known as the Orient Express route is that from Paris to Istanbul (Constantinople). It first runs up the valley of the Marne past Epernay and Châlons, then by the route of the Marne-Rhine Canal past Nancy, across the north of the Vosges to Strasbourg. It then crosses the Rhine and runs 43 miles northwards along the base of the Black Forest, next passes eastwards to the Neckar valley, and after winding through the most fertile and populous part of that valley past Stuttgart, goes on to Ulm on the Danube. Thence it runs eastwards past Augsburg, Munich, and Salzburg, rejoins the Danube valley at Linz, and follows that valley past Vienna, Bratislava, and Budapest to Belgrade. The total length of the route to Istanbul is 1,949 miles (from London 2,237 miles), that from Paris to Salonica 1,726 miles. A shorter route to Istanbul is that followed by the Simplon-Orient Express, by the Simplon Tunnel, through North Italy and then through Trieste to Ljubljana and connecting with Belgrade by the Save valley. The Anatolian railway, beginning at Haidar Pasha, and running to Konya, may be looked upon as a continuation of this railway. It is on the same gauge, thus rendering possible the connection of the lines by a train-ferry. At Konya begins the 'Baghdad Railway,' also on the standard gauge, which crosses the Taurus range to the north and east of the Cilician Gates, then descends to Adana in the Cilician plains, crosses the Amanus range in several tunnels and across several deep river gorges, and after bridging the Euphrates at Jerablus passes eastwards to Nisibin, and is destined to reach Baghdad by Mosul. At the close of the War only about 200 miles remained to be completed and this link is now made by motor. A branch from this line runs south to Alexandretta (since 1914), and another by Aleppo to Damascus, whence one railway on the gauge of 3 ft. $5\frac{1}{4}$ ins. runs south-east of the Jordan to Mecca, and

another west of the Jordan has been connected since about the end of 1918 with the Nile valley railways, crossing the Suez Canal at El Kantara. Through connections with Egypt are now made, a short length of motor service running to Haifa in Palestine.

The other great link of railway with Asia is that afforded by the Trans-Siberian Railway. The natural route is *via* the great junction of Berlin to Moscow, thence to the Manchurian frontier. It has been possible since 1936 to travel by rail directly from Calais to Canton.

Road and Air Routes in Europe. Road building has been carried to the pitch of perfection in western Europe, but eastern and south-eastern Europe are still largely without all-weather motor roads. A main route from the west to Istanbul is under construction.

All the great European cities are linked by regular air services. Not unnaturally, the greatest use has been made of the new mode of quick travel in those countries such as Russia where distance is a great enemy. Air services link Moscow with Iran (Persia) as well as with the Far East: the great colonial powers—Britain, France, Belgium, Holland, and Italy have naturally developed air routes to their Asiatic or African possessions.

THE BRITISH ISLES

The British Isles lie in the north-west of Europe, between the parallels of 50° and 60° N. To be more precise, the fiftieth parallel of latitude runs a little to the north of Lizard Point in Cornwall and the Scilly Isles, and the sixtieth through the southern end of the mainland of Shetland. The meridian of 0° passes, of course, through London (Greenwich) whilst longitude 10° west passes through the western peninsulas of Ireland.

The Surface of England and Wales. Of the countries which make up the British Isles, England is that which has the greatest proportion of the surface available for production or purposes subsidiary to production. According to the most recent agricultural returns, more than 70 per cent. of the entire area of land and water was under crops or grass or lying fallow, and when it is considered that about 5 per cent. of the surface was occupied by woods, and that a large area is taken up by towns, factories, roads, and railways, it will be seen that the area occupied by unproductive hill and moorland is comparatively small—about 11 per cent.

The hills and mountains of England are chiefly in the north and west. Indeed, Britain as a whole can be divided roughly into two halves, ' Highland Britain ' and ' Lowland Britain.' Highland Britain occupies the north and west; lowland Britain the south and east. The Cheviot Hills with their broad spurs, and the tablelands of the Pennine Chain, ' the backbone of England,' as it has been called, which runs from north to south from the Scottish border into the heart of Derbyshire, cover a considerable extent of ground, and, though almost entirely productive, are fit, so far as agriculture is concerned, for little else than sheep-pastures, so that in these districts the population is even now very sparse. Other extensive tracts with a topography too hilly or a soil too poor for intensive agriculture include the Lake District and the moorlands of Devon and Cornwall as well as certain tracts in lowland Britain such as the Yorkshire moors and parts of the chalk hills and downs—Salisbury Plain and the Marlborough Downs in Wiltshire, and the Chiltern Hills. In addition, there are considerable tracts of light, hungry soil or sandy areas such as the Bagshot area south-west of London, the New Forest of Hampshire, and the ' Breckland ' of Norfolk and Suffolk.

As will be mentioned below, the upland masses of the Pennines, the Lake District and the south-west have rendered difficult the construction of roads and railways. Even in the south-east roads and railways out of London seek the gaps through the Chilterns or the North Downs, but otherwise physical features in the south and midlands rarely present insuperable difficulties to the development of a road and rail network.

In Wales the proportion of hilly and mountainous country is much greater than in England, and the area of land under crops or grass or in bare fallow is rather less than 54 per cent. against 30 per cent. occupied by moorland and rough pasture. The ranges of the Welsh hills are, however, short, and there are many openings allowing an easy passage for railways and roads.

The Surface of Scotland. Scotland is the most mountainous part of the British Isles, and its northern half has hills and mountains so closely packed together that even yet there are few roads leading through the narrow and sparsely peopled valleys between them. For long the only road across the Grampians—the mountains lying immediately to the north of the central lowlands—was that which leads up to the valley of the Garry, a tributary of the Tay, and after crossing the Drumouchter Pass at the height of 1,484 feet, descends a tributary of the Spey to the valley of that river. This road is now accompanied by a railway, which is continued near the east coast to the most northerly towns of the mainland of the country (Wick and Thurso). Of the surface of Scotland less than one-fourth is under crops or grass or in bare fallow, and the greater part of the land suitable for cropping is confined to the area already referred to as the central lowlands, an area roughly definable as bounded by two parallel lines, one stretching from Stonehaven in Kincardineshire to the Firth of Clyde opposite Greenock, the other from Dunbar in Haddingtonshire to the southern part of the Ayrshire coast. In this lowland area there lies, moreover, most of the great mineral wealth—the coal—of Scotland, and therefore most of its manufacturing industry; so that this region, which has at all periods of Scottish history been the most densely peopled part of the country, now contains a greater proportion of the population than ever.

Climate. The mildness and equableness of the climate of the British Isles as a whole have already been explained and illustrated under more general headings (p. 44). The special advantages of the climate of the British Isles with regard to production are that it is favourable to active exertion throughout the day all the year round, and even for the most part stimulates to active exertion; that the mildness of the winter causes little or no interruption to field labour in any of the parts best suited to agriculture, and its comparative freedom from heavy snowfalls causes little interruption to communication; and that, for some reason or other, the climate

seems to be unfavourable to the existence of insect pests which infest similar crops grown elsewhere, while, nevertheless, it is seldom unfavourable to domesticated animals. For the sake of comparison with other countries it is well to remember that the average annual rainfall at Greenwich (in one of the drier parts of Great Britain) is about 25 inches, and that while the average mean temperature of the hottest month at Greenwich is 63½° F., at Edinburgh 58½°, that of the coldest month is about the same at both places, 39°. In general it may be said that the drier parts of Britain —the east—with an annual rainfall of 30 inches or less favour arable farming and the ripening of crops ; the midland regions and lowlands of the west with between 30 and 60 inches a year are more suited to grassland farming, for crops are liable to suffer from too much moisture inducing 'rust' diseases. It is only the highland areas of western Britain that rainfall or humidity conditions can be described as approaching the excessive and so render farming difficult. The distinction thus made between eastern and western regions is important as affecting legislation designed to encourage British agriculture.

The length of the shortest day (sunlight) varies from about 5½ hours in the extreme north to eight hours in the extreme south. In the more thickly peopled region of Scotland the shortest day in the year is about 6½ hours in length (in the latitude of Dundee). It is to be remembered also that the shortness of the day is to some extent compensated in the high latitudes to which the islands belong by the length of the twilight.

Agriculture. The table on p. 302 gives a conspectus of some of the main features of British agriculture. The first two columns are the years in which the recorded wheat area in Britain was respectively highest and lowest down to 1900. The second column when compared with the others shows the influences on British agriculture of competing agriculture in other parts of the world. The third shows the position which had been reached just before the War. The fourth column, for 1918, shows the results of special War-time effort. The fifth column, for 1931, shows the post-War trend before it was arrested by the protective legislation of the National Government. The result of the latter is seen in the column for 1935. Under nearly all important crops, it will be noticed, there is a great diminution in area in the last year as compared with the first. This coincides with a steady decrease (except for the arrest during the War and in recent years) in arable acreage and indeed in the acreage of crops and grass combined. The comparison under yields is, on the whole, more satisfactory, but it is uncertain how far this is due to improved farming and how far simply to the abandonment of inferior soils and fields unfavourably situated. Wheat is the only great crop which shows at once a considerable increase in yield, and since 1895

a considerable extension of area. The land no longer devoted to the crops enumerated is mainly given over to permanent pasture and forage crops, and the result is shown under the head of live-stock in the large increase under the head of cattle.

The agriculture of the United Kingdom was greatly, and to some extent permanently, affected by the War. The direct action of the enemy enormously reduced our agricultural imports, and indirectly it tended greatly to diminish our sources of supply through the decline of emigration to new countries and the new parts of older countries, as well as the slackening or almost entire cessation of railway construction in those regions. We may note that this tendency was to some extent counteracted by the great stimulus to production imparted by high prices. Owing to the action of the British Government the reduction of such imports was least marked in wheat among commodities imported in very large amounts. On the other hand, the import of butter decreased from 199,000 tons in the year ending June 30, 1913, to 71,000 in 1918–19, that of cheese increased from 117,000 tons to a maximum of 144,000 in the year ending June 30, 1917. If the flour imported be taken as uniformly equal to 1·4 of wheat, then the total import of wheat in each of the years 1913–20 compared with recent years in millions of tons was as follows :—

1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1923.	1921.	1928.	1929.	1930.	1931.	1935.
6·2	5·9	5·2	6·7	4·9	4·8	5·4	6·3	5·9	7·4	6·0	6·3	6·0	6·6	5·6

These figures must be taken as on the whole a remarkable testimony to the efficiency of the British sea and air defensive services. Still those for 1917 and 1918 bear speaking witness to the results of the submarine activity which began in February 1917, and explain the anxiety of the Government to make the country less dependent on imported food. This led to the attempt to stimulate the growth of grain at home by guaranteeing fixed minimum prices—abandoned in 1921—for the produce. The rise in prices independently of the government guarantee, together with the labour shortage due to the War, had the effect of greatly increasing the demand for fertilisers and labour-saving agricultural machinery. In forming an estimate of the ultimate effect of increased efforts to increase our home supplies of grain it should not be overlooked that even the urgency of war did not bring back the wheat area of the United Kingdom to within a million acres of that occupied by that crop in 1872—3,840,000 acres.

With reference to British agriculture we may note the creation of a fund known as the Development Fund under an Act passed in 1909. The purposes to which this fund is applied are mostly connected with agriculture or the utilisation of the land in some way, although fisheries are also included. Of far greater importance

ACREAGE UNDER PRINCIPAL CROPS IN THOUSAND ACRES

—	England.						Wales.						Scotland.						Britain.					
	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.
Wheat	3117	1340	1822	2161	1181	1747	136	41	41	96	16	25	136	31	62	79	50	101	3688	1117	1926	2636	1217	1873
Barley	1861	1838	1365	1395	993	761	158	112	91	106	36	29	230	217	192	153	88	76	2251	2166	1618	1656	1117	868
Oats	1512	2015	1866	2415	1486	1252	253	212	207	366	166	170	1018	1008	957	1211	835	827	2783	3296	3029	1021	2187	2246
Total corn crops[1]	7785	5719	5582	6882	1082	3141	556	402	313	599	210	216	1117	1279	1228	1493	982	1013	9758	7100	7152	8971	5301	5397
Potatoes	356	373	437	597	426	445	49	34	26	37	21	20	179	134	150	169	128	132	585	541	613	803	575	591
Turnips	1615	1362	1016	859	581	461	67	72	57	52	40	35	490	482	410	397	361	352	2172	1916	1513	1307	982	850
Mangolds	287	326	473	388	261	241	5	8	12	13	10	10	1	1	3	3	1	2	293	335	188	401	272	253
Total green crops[2]	2759	2167	2397	2236	1650	1813	127	119	101	112	71	181	689	610	615	597	510	526	3575	3226	3115	2907	2539	2599
Clover, sainfoin, and rotation grasses	2005	2826	2237	1875	2290	2088	261	329	286	220	291	282	1183	1575	1468	1351	1531	1120	3119	1730	3991	3450	1116	3755

Yield per Acre.

—	'85–94	'03–12	1924[3]	'25–31	1935.	'85–91	'03–12	—	'25–31	1935.	'85–91	'03–12	1924.	'25–31	1935.	'85–91	'03–12	1921.	'25–34	1935.
Wheat (bushels)	29·35	31·42	32·2	33·2	31·4	23·31	27·00		28·5	29·5	35·32	39·68	37·3	40·3	41·4	29·32	31·55	32·4	32·3	33·5
Barley ,,	33·07	32·99	32·7	32·6	33·4	28·03	30·89		27·6	28·0	35·26	35·69	36·0	36·6	39·6	33·02	33·19	32·7	33·8	34·7
Oats ,,	40·58	41·23	42·8	45·9	46·8	32·58	31·91		39·6	40·2	35·60	37·42	40·7	52·5	56·8	28·21	39·62	41·1	43·5	44·9
Hops (cwt.)	7·71	9·10	17·1	12·3	13·6	—	—		—	—	—	—	—	—	—	7·71	9·10	17·1	12·3	13·6
Potatoes (tons)	5·91	6·03	6·0	6·5	6·3	5·56	5·11		5·6	5·1	5·61	6·11	6·1	6·9	6·7	5·82	6·08	6·0	6·6	6·4
Turnips ,,	12·42	13·03	13·9	11·9	9·1	14·13	15·26		12·6	11·5	11·89	16·38	16·6	16·0	16·2	13·09	14·07	14·8	13·6	12·4
Mangolds ,,	17·48	19·49	20·2	18·9	19·4	16·30	17·77		16·8	16·1	16·22	17·89	17·2	19·6	20·6	17·45	19·41	20·2	18·8	18·3

NUMBER OF LIVE-STOCK IN MILLIONS

—	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.	1869.	1895.	1912.	1918.	1931.	1935.
Horses used in agriculture	1·1	1·2	1·1	0·7	0·6	0·5	0·1	0·2	0·1	0·09	0·08	0·07	0·2	0·2	0·2	0·1	0·1	0·1	1·1	1·6	1·4	0·89	0·78	0·7
Cows in calf or milk	—	1·8	2·1	2·3	2·1	2·7	—	0·3	0·3	0·3	0·3	0·4	—	0·4	0·4	0·1	0·5	0·4	—	2·5	2·8	3·0	3·2	3·5
Total cattle	3·7	4·5	5·1	5·4	5·2	5·7	0·6	0·7	0·8	0·8	0·8	0·8	1·0	1·2	1·2	1·2	1·2	1·3	5·3	6·4	7·1	7·4	7·3	7·9
Sheep	19·8	15·6	14·5	13·0	13·0	12·2	2·7	3·0	3·5	3·6	4·3	4·3	7·0	7·2	7·0	6·9	7·8	7·8	29·5	25·8	24·0	23·5	25·6	24·2
Pigs	1·6	2·5	2·3	1·5	2·5	3·5	0·2	0·3	0·2	0·2	0·2	0·3	0·1	0·2	0·2	0·1	0·2	0·3	1·9	2·9	2·7	1·8	2·9	4·1

Number of Live-Stock per Square Mile.

Horses	23	23	22	11			18	21	20	12			6	7	7	3								
Cows in calf or milk	—	35	41	45			—	37	39	40			—	14	15	13								
Total cattle	73	88	101	106			79	95	102	107			31	40	40	40								
Sheep	392	307	387	256			367	401	478	469			235	243	235	227								
Pigs	32	49	45	29			23	35	31	27			4	5	5	3								

[1] Including rye, peas, and beans. [2] Including carrots, cabbage, kohl rabi, vetches, &c. [3] England and Wales.

In the above tables the figures for the year 1918 have been retained because they show the effect of the stimulus provided by war-time needs. From 1918 to 1925 there was a steady drop to 6,320,800 acres under corn crops and 2,728,500 acres under green crops (Great Britain). Among live-stock there was a noteworthy increase in the number of pigs.

have been the post-War activities of the Ministry of Agriculture. Voluntary standardisation and grading under the National Mark system was introduced in 1929 and there followed under the auspices of the National Government the institution of Government Marketing Boards—though still on a nominally voluntary basis. A quota system was introduced to encourage home growing of wheat. The British farmer, hard hit by foreign competition, has benefited by these protective measures, but there are those who feel that the selective action of the Marketing Boards—dealing with hops, pigs, milk, &c.—is upsetting the balance of British farming based as it is essentially on a rotation of crops.

The growth of the beet-sugar industry in this country is of special interest. Experimentally sugar-beet had been cultivated on a small scale in various parts of England before the War. In 1911 experiments were made at the instance of the Development Commissioners at seven stations scattered over the south, south-east, and midlands of England, and as the result of those experiments the Commissioners regarded it as proved that beet giving yields equalling, if not exceeding, those obtained on the Continent could be grown in England. A factory was built at Cantley, near Norwich, in 1912 but largely with Dutch capital. The industry was not established when war broke out and the factory was closed. After the War assistance was given by the removal of the excise duty in 1922. In the budget of 1924–25 the import duty on sugar was reduced from 21*s.* to 11*s.* 8*d.* per cwt., and the Government subsequently agreed to grant a subsidy of 19*s.* 6*d.* per cwt. on home-made sugar (for the first four years, thenceforward being gradually reduced) but with an excise duty of 9*s.* 9*d.*, thus giving a subsidy to the industry of 21*s.* 5*d.* per cwt. By 1931 there were seventeen factories in operation in England and Scotland and the output for 1930–31 was 422,700 tons, against 291,500 in the preceding season or 50,000 in 1925–26. The subsidy was due to cease in 1935 but the industry, though of great value to the farmers in East Anglia, was unable to carry on without some measure of protection. The sugar-beet industry is advantageous to that of cattle-rearing. Further, it is an industry essentially attached to country districts as opposed to large towns. Where considerably more than 80 per cent. of the raw material is a waste product so far as sugar-manufacture is concerned, and this waste as a by-product finds its market in the same district as that in which the raw material is grown, the advantage of having the sugar-factories close to the beet-fields is obvious. In Germany, according to the industrial census of June 1907, 33·6 per cent. of the people employed in sugar-factories lived in communes of less than 2,000 inhabitants. Now the factory industry is essentially a seasonal one, being carried on only for three or four months during the winter—after the beets are reaped. It accordingly is one that

provides employment in country districts at a period when agricultural employment is slack, and is at the same time an aid in maintaining the labour supply for those districts all the year round.

Geographical factors influencing the growth of Britain's prosperity and trade. The foreign trade tables given below show that until 1900 the foreign commerce of the British Isles was much greater in value than that of any other country in the world, and greater also per head than that of most other countries in which there is a population of great density. The export trade fell behind that of the United States from 1900 to 1931 absolutely, but not per head. This shows that for foreign commerce this country must have peculiar advantages of one kind or another, and we must therefore consider what these advantages are. First of all it will be well merely to enumerate these advantages, as well as the disadvantages under which this country labours—or at least laboured until the War—and afterwards to examine more particularly the nature of those which require elucidation and to note in what ways there have been changes since the War in the influence of the factors concerned. It should be noted, however, that in this enumeration the sole point of view is the immediate interest of commerce. It is not intended to hint that all the so-called advantages and disadvantages are necessarily to be regarded as such with reference to the well-being of the people.

The advantages are :—

(1) A favourable climate.

(2) The abundance of coal and iron and some other raw materials, especially raw materials leaving much waste.

(3) The efficiency of British labour.

(4) The fact that nearly all the great mechanical inventions by which modern industry has been revolutionised originated in this country, which thus got the start of other countries in their application.

(5) The abundance of capital.

(6) The concentration of population in our industrial regions, facilitating the organisation of industry, including the minutest subdivision of labour.

(7) The completeness of the internal communications.

(8) The nearness of the coast on both sides.

(9) The abundance of seaports.

(10) The geographical position.

(11) The magnitude of the shipping.

(12) The extent of the British colonial and other possessions.

(13) The extent to which the English language is spread over the globe.

(14) The long establishment of our commercial relations with the best markets of the world.

(15) The free trade policy that prevailed in this country for more than seventy years.

The disadvantages that have to be placed on the other side are :—

(1) The dearness of land arising from the density of population and the great development of industry, a disadvantage necessarily most experienced in the great centres of industry.

(2) The deficiency of large water-powers, now essential in some branches of industry (p. 71).

(3) The higher rate of wages long paid in Great Britain compared with those paid by its chief rivals in manufacturing industry.

(4) The government and self-imposed restrictions on labour.

(5) The backward state of education, and especially of technical and commercial education, which existed in the United Kingdom compared with the point reached in this respect by some of its rivals at least until 1900 or even 1914.

(6) The irrational spelling of the English language.

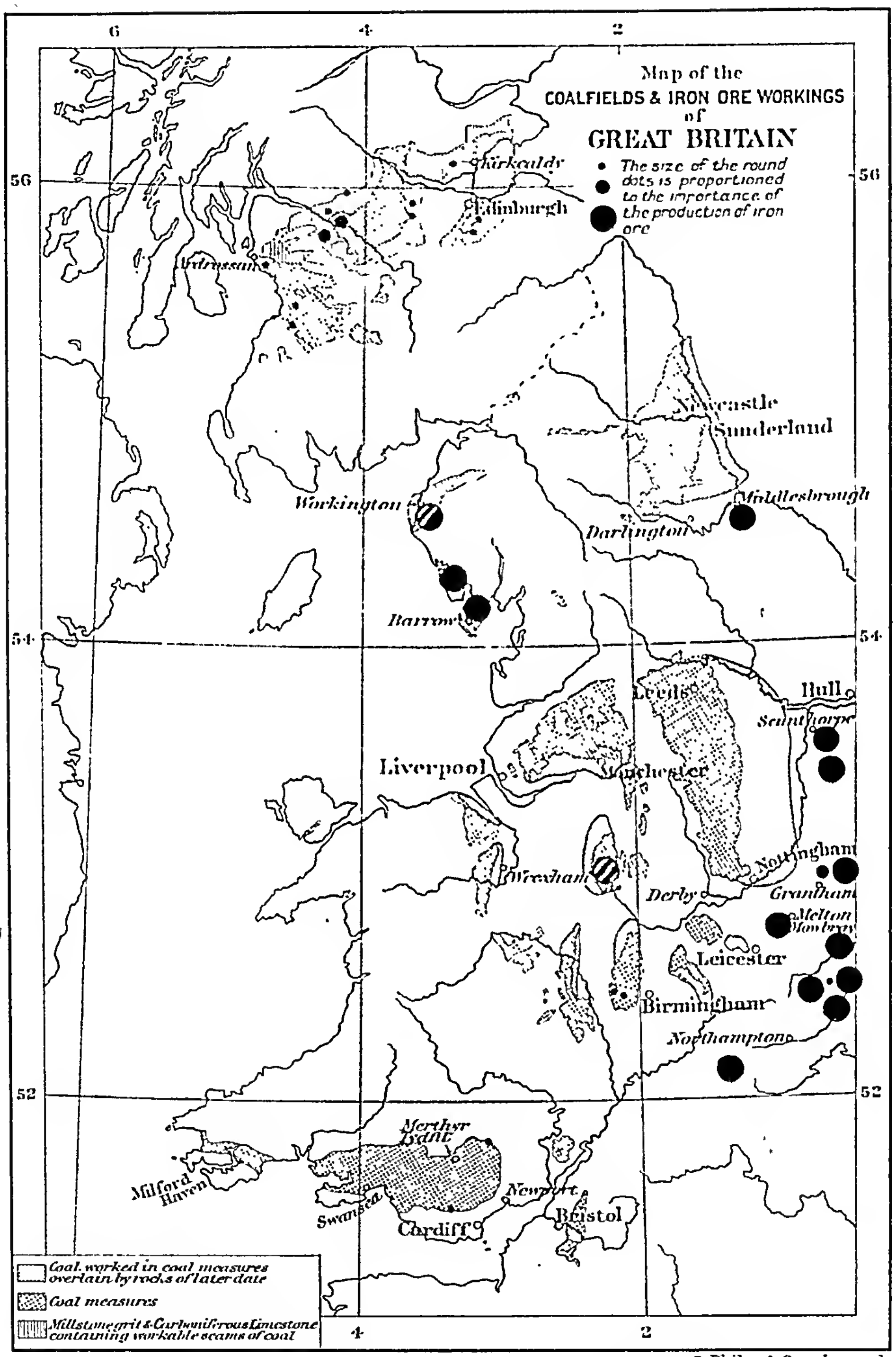
(7) The want of a decimal coinage and system of weights and measures.

(8) The high tariffs of many countries of the world while Britain still followed a free trade policy.

It scarcely needs to be pointed out that the advantages and disadvantages above enumerated are not mentioned in the order of their importance. Of the advantages, those from 1 to 6 are such as affect the production of articles of commerce, and the remainder, those which pertain to their distribution ; and of the former, Nos. 1 and 2 may be reckoned as natural advantages, Nos. 4, 5, and 6 advantages mainly due to historical causes. No. 3, the efficiency of the British artisan, is largely an historical advantage, due to the acquired skill resulting from the experience of generations and from familiarity with a gradual and constant series of improvements in industrial operations.

With regard to the advantage of the climate it is unnecessary to say more ; but in relation to the second of the advantages enumerated above, wealth in coal and iron, it is necessary to point out that the advantage we possess arises not only from their abundance, but also from the fact that important supplies of both are found quite close to seaports, and that the coal necessary to the smelting of the iron is at no great distance from the iron ores, though the old iron ores of the coal-fields themselves are almost completely worked out. It should also be noted that technical advances in the utilisation of coal, especially in connection with the iron industry, have redounded further to the advantage of Great Britain. Probably no other European country is better adapted than our own for such co-operative schemes as the development of an electricity grid with

generating stations on the coal-fields, because of the compactness of our great industrial areas, the density of their populations, and their situation on or in proximity to the coal-fields. On these points the map on p. 307 may for the most part be left to speak for itself. But it may be pointed out that the great coal-field of Durham and Northumberland is bisected by the estuary of the Tyne, to which belong the seaports which first carried on a great trade in coal, and is in immediate proximity to Sunderland and various minor ports, and that its southern end is close beside the iron deposits of Cleveland in the North Riding. Further, the coal-field of Cumberland includes the seaports of Maryport and Whitehaven, besides Workington, and lies close to the iron ores of south Cumberland and north Lancashire, a rich source of iron until their virtual exhaustion. The South Wales coal-field gave rise to a vast iron industry through the fact of its having possessed great beds of ironstone, though these are now worked scarcely at all in consequence of the facility with which less refractory ores can be imported from abroad, a fact which has led to the migration of the iron centres to the coast. The North Staffordshire is now the only coal-field with an appreciable output of iron ore. In Scotland the coal-fields are likewise close to the sea, and likewise were formerly rich in iron. In the west of Scotland the Ayrshire coal-field extends to the ports of Troon and Ardrossan ; in the Clyde basin the coal-field extends below the port of Glasgow, and the ports of Grangemouth, Alloa, Burntisland, Dysart, Leith, and others are either upon or quite near coal-fields farther east. The western coal-field supplies large quantities of splint coal, which can be used directly in the smelting of iron ores. The blackband ironstone once plentiful in parts of these coal-fields (as in Ayrshire and the Clyde basin) yielded a very fine quality of wrought iron, which before the cheapening of steel had come to be the principal ship-building material. The ironstone also is for the most part so rich in carbonaceous matter as to reduce considerably the expense for fuel in the operations preliminary to smelting. Limestone and ganister, two other minerals of great importance in the iron industry (see p. 260), are also abundant in Great Britain, and in some cases near the beds of iron ore. In recent years, with the exhaustion of the iron ores of the coal-fields, the chief centres of production of iron ore in England are the Midland and Cleveland districts, but the value is not proportionately great, because the ore is comparatively poor in iron, and that of Cleveland is phosphoric. It is worked near the outcrop, where it contains from about 35 to 40 per cent. of iron. The ore of Cumberland and the Furness district of Lancashire is a red hematite richer in iron, and containing very little phosphorus, and forming the only true Bessemer ores obtained in this country. Outside of the area shown in the map the hidden coal-field of East Kent, near



Longmans Green & Co. London, New York, Bombay, Calcutta & Madras

Statute Miles
0 50

Natural Scale
1: 4,000,000

Dover, has deposits of ironstone, and iron ores have been worked on the island of Raasay, east of Skye.

Exploratory borings have proved considerable extensions of British coal-fields under the cover of later rocks and there is no fear of the exhaustion of the coal. Reserves (including seams of 1 foot and upwards in thickness in depth down to 4,000 feet) total about 200,000 million tons, enough to last the country 800 years at the present rate of consumption. The difficulties in which the British coal industry has found itself after the War are due in the main to two causes—the diminution of the export trade and the uneconomic working of the older collieries in the older parts of the coal-fields. Most British coal-fields to-day can be divided into two halves—the older, shallower half, partly worked out and operated by old, small units; the newer, deeper half recently developed and operated by large modern units. Good examples of the twofold division are found both in Durham and in the Yorkshire-Nottinghamshire coal-fields.

Although the production of iron ore on the coal-fields of Great Britain is now comparatively small, the report on *The Iron Resources of the World* includes among the potential iron reserves of this country enormous deposits of clay ironstones belonging to the British coal-fields. In England these lie chiefly in the Yorkshire, Derbyshire, and Nottinghamshire field, in those of North and South Staffordshire, and the Severn coal-fields; and in Wales both in the northern field and along the northern margin of the South Wales field. The reserves of the Midland Jurassic fields are, however, twice as great.

The fourth, fifth, sixth, and seventh of the advantages enumerated above on p. 304 require no special elucidation, though it may be pointed out that (5) and (6), the abundance of capital, and the advanced organisation of industry, are in part a consequence of (4), that is, of the United Kingdom having got the start of other countries in modern mechanical appliances; but this again is subject to a qualification pointed out below on p. 312, and may now be a disadvantage in that our factories are equipped with machinery now out of date but too valuable to scrap. With regard to the eighth of our advantages, the nearness of the coast on both sides, it is hardly necessary to explain how this may place a manufacturing region within easy reach of many more markets than are accessible to one that has outlets only in one direction. The precise nature of this advantage is well illustrated by the trade of some of our seaports. Though Lancashire, on the west side of the Pennine Upland, has always been the great seat of our cotton manufactures, Hull exported in 1885 nearly as great a value of cotton yarn as Liverpool; Hull and Grimsby together much more than Liverpool; the eastern ports of Great Britain collectively always export more of

that yarn than the western ports. The reason of this is that continental nations (Germany, France, &c.) which were among our chief customers for cotton yarn, are more easily reached from the east side. The woollen manufactures, again, are mainly carried on to the east of the Pennine Upland, but the woven fabrics are much more largely exported from Liverpool than from any other port, though woollen yarns are exported thence only to a limited extent. The abundance of seaports, the ninth of the advantages enumerated above, is what enables the advantages just illustrated to be utilised; but it is obvious that it is an advantage also in another way, in the extent of the accommodation it provides for shipping. No doubt such accommodation can sometimes be provided artificially, as in most cases it needs to be improved artificially, but there is an enormous advantage in respect of cost where facilities are furnished by nature at a great many different points. In the British Isles there are more than twenty seaports with a natural depth of at least twenty-five feet at high water, and most of these are situated in the vicinity of the great seats of production. In view of the increasing size of the shipping of the present day this large number of deep harbours or harbours, which owing to their soft bottoms can easily be dredged, is a matter of peculiar importance to the commerce of this country.

The tenth of the advantages named above, the geographical position of the British Isles, is of great moment in more ways than one. In the first place, the 'silver streak' is a natural bulwark of the highest value. It enables the kingdom to place its chief reliance for defence upon the Navy and the Air Force, which make a much less heavy drain upon the working population than the vast armies which continental nations are obliged to train and keep on foot. Secondly, it is of great importance to British commerce that our islands occupy a somewhat central position among the nations that carry on a great commerce at the present day. It was of no importance to us that America lay on our west, until America began to rear a population more or less dependent on foreign commerce. In view of the three advantages specially considered in the last two paragraphs, it may safely be asserted that this country has in the aggregate greater advantages than any other area of equal extent for reaching all those parts of the world which are most conveniently reached from the seaboard. The effects of this with respect to the distribution of our own products will be understood readily enough from the illustration already given of the advantage of having seaports on different sides; and its influence on our trade in foreign goods is considered below on p. 353.

The advantages accruing to British commerce from the extent of the British Empire are in a large measure indirect. The fact that throughout the Empire the English language is the language of

commerce is important, and the fact that British officials throughout the Empire are likely to be more or less in touch with British traders is no less so. Since 1887 several colonial or, as they have been called since 1907, imperial conferences, have been held, in which among other matters the interests of trade have been discussed. The self-governing dominions and colonies now give preference in one form or other to imports from the mother country and in many cases from other parts of the Empire. In this policy Canada was the pioneer in 1898. South Africa and New Zealand followed in 1903, and Australia in 1908. The granting of a preferential tariff to the members of the Empire, generally on a reciprocal basis, is now usual among the dominions and colonies themselves. Of recent years a great deal has been done to foster inter-imperial trade by the great Empire Exhibition at Wembley (London) in 1924 and 1925, by the Imperial Conference in 1926, followed by the research and advertising work of the Empire Marketing Board and latterly by various conferences.

Inasmuch as fiscal policy undoubtedly affects the commercial value of local resources and place relations, it cannot be said that the discussion of the preferential tariffs between this country and the constituent parts of the Empire or the ideal of Empire Free Trade would be altogether out of place in this work; but the omission of such a discussion will no doubt be excused in view of the vastness of the subject and of the fact that the relevant considerations are more economic than geographical. There is here given, however, a table, from figures already for the most part to be found elsewhere in this work, designed to exhibit in a compact form data bearing upon this discussion or of interest in connection with it. Since the growth in the British export trade to British possessions down to that period before the War in which its proportion of the whole export reached a maximum (1901–05), mainly due to the increase in the trade with Hong Kong (which is not really colonial trade at all, but trade with China and other Eastern countries) and South Africa, the table contains lines showing the variations in that trade apart from these possessions. The fifth line shows the total export trade with our nearest neighbours, and the last with a group of countries which had, before the War, the most highly protective tariffs. Entirely new factors affect the post-War position. One is the ever-increasing growth of manufacturing industries in all countries of the world, so that Britain can never again be a sole supplier of manufactured articles to a world market, but must fight the severe competition both of the home-produced article and of her rivals in the export field such as Japan. Further, the use of oil and the development of local coal and water-power resources have led to a diminished demand for British coal. It is clear also that the Great War dislocated world trade and drove it into new

channels—many of which have remained permanent, whilst the War taught the nations of the world to think nationally rather than internationally.

With regard to language, in order to realise the importance of this factor one has only to think of the rapid increase of an English-speaking population, not only in the more important British dominions and colonies, but also in the United States.

Of the economic disadvantages of this country mentioned above the deficiency of water-power is, in view of the great wealth in conveniently situated coal, a disadvantage chiefly in relation to those industries which demand very high powers. Such industries have, it may be noted, developed the water-power resources as

United Kingdom.—Exports of British and Irish Produce and Manufactures,[1] *exclusive of ships and their machinery. Percentages of total values in—*

To	1871–75	1876–80	1881–85	1886–90	1891–95	1896–1900	1901–5	1906–10	1911–13	1925–29	1931–35
All British possessions	26·84	33·5	35·0	34·4	33·1	34·4	37·8	33·7	36·4	43·0	50·4
All British possessions, except Hong Kong	25·5	31·9	33·6	33·31	32·2	33·5	36·7	32·9	35·7	42·4	49·5
All British possessions, except Hong Kong and South Africa	23·9	29·3	31·3	30·6	28·4	28·4	29·8	29·4	31·5	38·2	43·0
All foreign countries	73·2	66·5	65·0	65·6	66·9	65·6	62·2	66·3	63·6	51·7	49·6
France, Belgium, Holland, Germany, Sweden, and Norway	28·8	26·2	24·0	21·9	23·6	25·6	22·5	22·7	22·8	16·5	18·3
France, Germany, Italy, Russia, and United States	37·6	32·8	31·7	30·9	30·7	29·5	26·9	27·7	25·8	17·3	17·3

at Kinlochleven and near Fort William. Elsewhere, in North Wales and from the important new works in Kircudbright, water-power is utilised and electricity generated, the works being connected with the 'grid system.' The total possible annual saving of coal by the use of water-power in the United Kingdom has been estimated at only 1,200,000 tons, but it may be pointed out that the present need of the country is to find coal-using industries rather than save coal. A water-power scheme which dwarfs the greatest of the world's installations was prepared in 1920 by the Ministry of Transport. It is proposed to construct a concrete barrage, serving as a bridge for railway and motor traffic, across the Severn estuary near the Tunnel, where the channel is 2½ miles wide. By means of a series of sluices and turbines the tides will be harnessed to develop over 500,000 horse-power during a ten-hours' day, with a peak-load capacity of over a million horse-power at a cost of just

[1] Excluding the Irish Free State from April 1, 1923.

over $\frac{1}{2}d.$ per unit. Above the barrage a deep-water basin of over 27 square miles would be utilisable by the largest vessels at all states of the tide. The estimated cost is £30,000,000. Such an installation would, it is claimed, supply the industries of the Midlands and South Wales with a permanent supply of cheap electric power, and set free annually 4,000,000 tons of coal used for generating power.

The next disadvantage mentioned, the dearness of land, may be regarded as a necessary result of the development of our industries. The third, the higher rate of wages, if considered by itself, cannot but be looked upon as a disadvantage in the struggle for cheapness into which the competition for foreign commerce in a large measure resolves itself; but it must not be forgotten that in considering the cost of labour the relative efficiency of labour has always to be taken into account. With the increased standard of living and the consequent rise in real wages together with international agreements on labour conditions, these differences are rapidly disappearing.

The state of technical and commercial education in this country was a few years ago a more serious disadvantage than it is now, but constant efforts in this direction are needed to bring or keep us abreast of our rivals.

The want of a decimal coinage and system of weights and measures is also felt among the mercantile class as an impediment in business transactions.

So much with regard to the advantages and disadvantages of this country in relation to foreign commerce; but we must bear in mind that the greatest possible advantages are exhaustible, and, however vast the commerce of a country may be, it is necessary to that country's prosperity, in so far as it depends on foreign commerce, that that commerce should go on increasing, and the increase at least keep pace with the growth of the population. Enormous as the advantages of the British Isles may be, if British commerce has been pushed too far on the strength of merely temporary advantages, other nations will be apt to gain at British expense. There will be a difficulty in maintaining the distance ahead to which British commerce has reached. To assist in attaining this end so far as possible, a government Department of Overseas Trade, with correspondents of various rank in different parts of the world, was set up in July 1917.

Population. Since the publication of the first edition of this work there have been five censuses of the United Kingdom, and the table below shows the rate of increase of population at these censuses of the different parts of the kingdom, as compared with the rate in 1871–81, and the most nearly corresponding figures for Germany and the United States (exclusive of Alaska, Hawaii, and Puerto Rico).

This table is sufficient to indicate the general trend of population. The pre-War moderate increase in Britain (with an absolute decline in Ireland) has given place to a slight increase in Britain as a whole but an absolute decline in Scotland and Wales. Actually this is rural depopulation, and the actual or relative decline applies to rural counties of England as well. The increase is mainly in the main manufacturing belt of Britain—an area stretching from Manchester to London which now has more than 57 per cent. of the people of the country. In Ireland the decline has been arrested and given place to a moderate increase.

Rate of Increase or Decrease of Population per cent. per annum.

—	1871–81.	1881–91.	1891–1901.	1901–11.	1911–21.	1921–31.
England	1·37	1·11	1·04	1·01	0·55	0·63
Wales	1·12	1·11	1·22	1·64	0·84	−0·02
Scotland	1·07	0·75	1·06	0·62	0·25	−0·08
Great Britain . . .	1·32	1·06	1·14	0·99	0·46	0·48
Ireland	−0·45	−1·06	−0·54	−0·16	−0·34	−0·37
United Kingdom . . .	1·03	0·79	0·95	0·87	—	—
	1871–80.	1880–90.	1890–1900.	1900–10.	1910–20.	1920–30
Germany . . .	1·08	1·08	1·32	1·43	0·55	0·56
United States . .	2·66	2·24	1·90	1·93	1·40	1·61

Actually such crude figures are misleading, and reference should be made to Dr. Kuczynski's paper in *Geography* of March 1937, in which it is shown that actually population is declining rapidly in all countries of Europe except Russia and parts of the south-east. Unemployment has become a permanent feature in Britain and many other countries, and is held by many to be unavoidable and likely to be aggravated by a decreasing population.

It will be seen from the figures of the United States that population there is still increasing at a comparatively rapid rate, despite the virtual cessation of immigration.

Urbanisation of Population. The expansion of population in a manufacturing country may tend to a greater degree of centralisation in manufacturing industries. Now it is to be noticed that while undoubtedly there are forces constantly acting in the direction of such concentration, there are others of an opposite tendency. The centralising forces are necessarily those most in the public eye. Enlarging factories, more and more complicated and expensive machinery, improvements in handling and transport, the growing magnitude of industrial combinations, all tend of necessity to attract the general attention. But it may be doubted whether the decentralising forces are not after all the stronger. Our own country is certainly one with a highly centralised manufacturing industry, but it is not the only one, and it may be worth while to consider

the action of centralising and decentralising forces generally before returning to the consideration of the British Isles in particular.

First, we may note, as in favour of centralisation, the growing complexity of manufacturing processes, and the consequent demand for more complicated machinery and more highly skilled labour of all kinds. These things are to be met with solely in the most highly advanced manufacturing countries or regions. Such countries and regions accordingly tend to have a preponderating advantage in proportion to the complexity of the industry and the amount and degree of skilled labour involved. Hence, under modern conditions the production of iron and steel, the manufacture of complicated machinery, and the chemical industries, are almost confined to such countries and regions, and in them tend to be highly centralised. Many of the changes of recent years in connection with these industries have been of such a nature as to emphasise this tendency.

Improvements in the means of transport also tend on the whole towards centralisation. They tend to increase the advantages of a distant relatively to a nearer centre of production, which has previously had an advantage solely in consequence of greater proximity to the market. Before the War there was continued improvement under this head, but it must be borne in mind that the improvements of that nature do not benefit different centres of production equally. This country being one that necessarily carries on all its external commerce by sea is most interested in improvements in ocean navigation ; and it is at least probable that all the economies in ocean transport that have taken place through the enlargement of cargo vessels, the improvement of marine engines and boilers, the enlargement and improvement of harbours, and the improvement of the means of communication between the seaboard and the interior, have in the aggregate conferred more advantages on this country than any other. But even if this is true, the significance of the qualification involved in the words ' in the aggregate ' must not be overlooked. On the other hand, the improvement of the means of communication between inland centres of production and places that cannot easily be reached from the seaboard is obviously more in favour of those inland centres than of British seats of manufacture ; and such improvements are constantly being effected by the extension of railways and modern roads.

When railways are introduced into new lands adapted for the production of food and raw produce, that tends in a special degree towards the centralisation of manufactures. In the United States, the Canadian Prairies, Argentina, Russia, and Siberia, the laying of railways in such regions has been steadily advancing, with the inevitable result of stimulating manufactures in different parts of the world in which such industries already existed.

Lastly, the process of refrigeration and cold storage has also

acted powerfully in the same direction. It has added to the value of new and distant lands by making articles of food available in remote markets which formerly could not be thus supplied.

Turning now to the consideration of the decentralising forces affecting manufacturing industries, we should note, first, that in the countries in which such industries are first developed the resources most favourably situated for development, according to the circumstances of the time, are likely to be utilised first. In the case of coal, for example, the thickest and richest seams are those likely to be first used up. Unless, therefore, economies are effected in the method of working the mines, the cost of producing an equal quantity of coal is likely to become greater and greater. With respect to such resources these countries, to use the language of economists, are likely first to experience the operation of the Law of Diminishing Returns.

Further, the existence of local supplies of raw materials, local labour, and a local market are always tending towards the establishment of local manufactures where such advantages exist. In the initial stages of the development of a region of raw production, local labour and a local market may count for little in the starting of manufactures utilising the raw material, but they may quickly come to do so if the region is already thickly peopled, and only the production of the particular raw material is new. The same is true of the development of regions rich in coal. Water-power with electricity as a handmaid is now daily becoming a more and more influential factor in the redistribution of industry, and is sure to become even more so as coal and other fuels become dearer.

If now in the light of these general considerations we turn our attention specially to our own country, we note that our commerce down to the outbreak of the War on the whole still continued to increase, but yet not so rapidly as that of some rival countries. That the United Kingdom shared largely in the expansion of commerce brought about by the development of the gold-fields in South Africa may be taken as a fact, but, on the other hand, that same expansion has fostered the development of manufactures in South Africa itself. Further, a large part of the expansion must be in the importation of machinery and other articles of metal, in which we are encountering a keener and keener competition from other countries. Since the War the spread of nationalism, the erection of tariff barriers, and the virtual extinction of international free trade have all tended to encourage the local development of industries.

British Industries. The local distribution of British manufacturing industries presents many points of interest, some of them purely geographical, some historical. In the case of the greatest of these industries, that of **cotton**, it is a noteworthy fact that it is almost wholly confined to a few localities in the west of Great

Britain. In England the spinning and weaving of cotton are almost restricted to the west side of the Pennine Upland, mainly to that part of Lancashire which lies to the south of the Ribble; in Scotland, to Glasgow and other manufacturing towns in the west. The reason for this distribution is geographical. In the Middle Ages the local supply of wool from the Pennine sheep gave encouragement to a crofter's industry of spinning and weaving. The local soft waters were suitable for scouring and dyeing and later the water-power from swift streams came to be used. Liverpool grew as a port with the 'trade triangle' and the new textile material cotton was naturally introduced here to a community already skilled in the processes of spinning and weaving. The humid climate of the western side of the Pennines proved peculiarly favourable, whilst with the coming of the industrial revolution there was coal present in abundance. Both for the spinning and weaving of cotton a moist climate is of considerable importance, and in districts where the manufacture is carried on, dry weather, and especially cold and dry weather, adds considerably to the expense of the operations; for where the air is too dry the yarn is liable to become brittle through losing its natural moisture, and all the more likely is this to result when, as on cold days, the temperature of the spinning-'mill' or weaving-'shed' is much above the temperature of the air outside. The failure of cotton factories started in other parts of England has been attributed in some cases to no other factor. Even the shelter of a hill against dry east winds is considered a matter of high pecuniary value.

In England the town most closely associated with the cotton industry is Manchester. This is one of those towns which owed their original importance in a large measure to the fact of their lying in a plain just on the border of hill country, a position which, as already explained, naturally leads to the convergence of roads from many parts of the plain as well as from one or more valleys among the hills. It is hence natural to find that a town has been situated in this position from a very early date. Manchester (the ancient Mancunium) was already in existence in the time of the Romans, and in the early part of the fourteenth century it became known as a manufacturing town through the settlement of Flemings here. But the first materials of its textile manufactures were wool, a local product, and linen yarn obtained from Ireland. It is uncertain when cotton was added to these, and though Manchester 'cottons' are spoken of even in the fourteenth century, it was not till long after that pure cotton fabrics were made there, or anywhere else in England. Since the great inventions of the eighteenth century Manchester has grown with the cotton industry, the trade in cotton goods and yarns having always been centred here. In 1774 Manchester and Salford together had a population of little more than

27,000; at the census of 1801 the joint population of the two townships had risen to 84,000. In 1891 the population within a radius of twelve miles of Manchester Exchange was upwards of 1,600,000, in 1921 it was over 2,200,000 and in 1931, 2,300,000.

Among the surrounding towns engaged in the cotton industry are Oldham, Bolton, Bury, Rochdale, and other towns which have enriched the bleak Lancashire moorlands to the north and east of Manchester; Stockport and Hyde in Cheshire to the south, and Glossop in a Derbyshire valley south-east of Manchester: all situated on the great coal-field west of the Pennine Upland; and further north are Preston, Blackburn, Accrington, and Burnley, all Lancashire towns, and the last three likewise situated on the same coal-field. Oldham and Bolton are the two towns most noted for cotton-spinning mills, the former being engaged chiefly in the production of medium yarns, the latter of the 'higher counts.' The northern towns of Burnley, Blackburn, Preston, Nelson, and Accrington, all situated along the route of the railway from Preston to Skipton, take the lead in cotton-weaving. All these towns are just at the base of the Pennine Upland, some at a level of about 500 feet. Wigan, though it is also a cotton-manufacturing town, is notable chiefly as the principal centre of the coal-trade in Lancashire. In 1900 there were no fewer than thirty-five towns in South Lancashire and the parts immediately adjoining which had at least 100,000 spindles engaged in this industry, Oldham heading the list with nearly 12 millions and Bolton following with 5 millions. In 1914 the number of spindles belonging to the Oldham federation was 19 millions, to that of Bolton, 9 millions. According to the Census of Production taken in 1924 about 1,380,000,000 lbs. of yarn were produced, valued at £187 millions, of which 11·8 per cent. was exported. Piece-goods made for sale were valued at £157 millions, of which 4,648,718,000 yards or 85·7 per cent. were exported. Miscellaneous cotton manufactures totalled £12·5 millions.

For its supplies of raw cotton the great cotton manufacturing region of England is still dependent mainly on Liverpool, but direct shipments of cotton now come to Manchester by means of the ship-canal constructed between 1887 and 1893 and opened for traffic on the first day of 1894. It extends from Eastham on the south side of the Mersey to the heart of Manchester, has a total length of 35½ miles, and a minimum depth of 28 feet. There are three entrance locks at Eastham, the largest of which is 600 feet long by 80 feet wide, and the bottom width of the canal at the full depth is, with a few exceptions, 120 feet, which is sufficient to allow of large ships passing one another, and at the bend at Runcorn the width has been increased to 175 feet. The port is provided with graving docks, large grain elevators, oil-tanks, cold storage accommodation, and

other modern equipment. There are new regular lines of steamers to ports in very many parts of the world. The traffic of the port, which includes Warrington and Runcorn, has grown steadily and rapidly. In the case of the Manchester ship canal it has also to be borne in mind that its whole length is laid through a part of the busiest industrial region of England, so that it may be looked upon as destined to form a double line of quays with a total length of 70 miles. In 1894 the total value of the trade of the port was £6·9 millions (about 40 per cent. imports), in 1929 it amounted to £69·5 millions (90 per cent. imports). The total tonnage of the traffic in 1913 was 5·78 million tons, of which 5·46 millions was sea-borne ; 1925 and 1926 were each in their turn ' record ' years : in 1926 ship canal tolls were paid on a sea-borne tonnage of 6·53 million tons. The total capital expenditure on the canal down to the end of 1913 was nearly £17,000,000. The first dividend on the preference stock belonging to the Corporation of Manchester ($2\frac{1}{2}$ per cent.) was paid for the year 1915. In 1926, $3\frac{1}{2}$ per cent. was paid on the Manchester Ship Canal Corporation stock, 5 per cent. on the Preference and Ordinary Shares of the Company. Gross revenue of Canal in 1930 was £1,900,000 and traffic receipts £1,400,000. Traffic paying toll amounted to 6,291,000 tons.

As the nature of the case renders the growth of the port of Manchester of peculiar interest some details are given in the table opposite.

It will be observed that petroleum, an article of comparatively small value in proportion to its bulk, an article largely conveyed in special steamers, is the commodity in which the trade of Manchester has grown most rapidly to the prejudice of that of Liverpool. This is a natural result of the better situation of Manchester with reference to a consuming population. In paper-making materials we have another bulky article, and in relation to it we have to consider the situation of the mills, and with reference to that again the situation of the streams supplying the water and that of the consumers of the product. Raw cotton is by far the most valuable of the articles imported at Manchester. The growth of that import as compared with the corresponding import at Liverpool was for a considerable period steady, though slow, but appears now to be increasing. It shows the difficulty of displacing an old market requiring a high degree of organisation, but it seems probable that the advance of Manchester under this head will go on at an accelerated rate when the growth in the total trade has reached such a point as to favour higher organisations of the market. The hold which Liverpool retains on the export trade of cotton tissues is not surprising to any one who considers the widespread distribution of the markets for these products, and the relations of the chief weaving towns to the ports of Liverpool and Manchester respectively. Among recent

developments, all illustrative of the influence of an enormous consuming population in the immediate neighbourhood, may be mentioned the import trade in frozen meat, wool, and tea. The first large cargo of wool from Australasia reached the port in July 1916, and large provision has now been made for this trade.

PRINCIPAL ARTICLES OF TRADE OF THE PORT OF MANCHESTER. PERCENTAGE OF THE TOTAL TRADE OF THE UNITED KINGDOM IN THE ARTICLES NAMED AT LIVERPOOL (L) AND MANCHESTER (M) BY QUANTITY (MACHINERY AND WOOD IN 1929 BY VALUE).

—		1893.	1894.	1906.	1912.	1929.	1935.
IMPORTS.							
Raw cotton . .	L	92·3	90·5	77·7	79·3	75·2	65·7
	M	—	1·6	16·6	16·6	23·1	33·4
Paper-making materials . .	L	10·8	10·4	3·0	1·8	0·6	0·6
	M	—	4·1	14·3	10·9	1·8	9·7
Wood, sawn and hewn . .	L	9·2	8·2	6·6	8·4	20·2	26·3
	M	—	1·2	5·6	5·2	5·4	4·5
Manganese ore .	L	—	—	20·6	20·3	19·0	21·3
	M	—	—	7·3	10·3	13·4	6·0
Petroleum . .	L	22·4	19·9	9·9	8·3	22·8	6·9
	M	—	0·3	12·1	9·8	48·7	13·0
Wheat . . .	L	28·9	25·3	25·6	23·0	26·4	19·0
	M	—	0·1	5·3	7·8	9·3	10·2
Maize . . .	L	25·0	24·9	22·9	17·7	20·9	25·7
	M	—	0·1	2·4	2·4	2·4	4·1
Bacon and hams .	L	63·3	61·7	51·4	34·9	15·0	10·5
	M	—	—	1·9	1·2	1·0	1·9
EXPORTS.							
Cotton tissues .	L	75·9	74·2	69·0	66·2	65·7	67·8
	M	—	3·6	9·1	12·3	12·6	7·2
Cotton yarn. .	L	39·4	35·7	34·2	31·2	23·3	34·9
	M	—	17·2	22·2	25·2	28·1	15·5
Woollen and worsted tissues . .	L	48·2	40·3	57·2	32·1	49·5	37·4
	M	—	0·5	2·6	3·5	2·9	4·0
Machinery, &c. .	L	34·3	31·2	32·4	32·9	37·4	38·8
	M	—	2·1	5·1	5·6	7·5	3·9

At a distance from the Manchester district the only large town in which cotton manufactures form the staple industry is Nottingham on the Trent, in which certain branches of the manufacture, that of cotton hosiery, and the making of machine-made net and lace, the latter less important than formerly, have their chief seat.

In Scotland, though cotton manufactures are carried on very largely, the only town whose name is specially associated with a branch of this industry is Paisley, in Renfrewshire, where the manufacture of cotton thread has its chief seat. The cotton fabrics

mostly made in Scotland are very fine lawns, muslins, and certain kinds of figured and coloured dress goods.

The West Riding of Yorkshire—the area of the West Riding coal-field—is for the **woollen industry** of Great Britain much what Lancashire is for the cotton industry, though this section of the textile manufactures of the country is not so restricted in its range as the other. The principal centre of the trade of this region is Leeds, which occupies a situation geographically very similar to that of Manchester.

Leeds stands on the Aire amidst the gently undulating country that lies between the broad flat Vale of York and the narrow dales on the west. It thus has free communication with the north, east, and south-east, and on the west it commands two principal lines of communication, one by the valleys of the Calder and Colne to Manchester and South Lancashire, the other by the valley of the Aire to Mid-Lancashire. Like Manchester, it is a very old seat of trade and manufacturing industry. It is described by Camden (1607) as 'much enriched by the woollen manufacture,' and nowadays, while still retaining its importance in the woollen trade, it has added to that many other important industries. It is the commercial centre of the woollen trade rather than a manufacturing centre. Besides being the chief centre of the wholesale clothing trade in the country, it probably stands first also in the leather trade, and has considerable iron and steel manufactures.

The narrow dales of Yorkshire to the west of Leeds are filled with larger or smaller manufacturing towns engaged in the woollen industry. In some of them its origin belongs to as remote a date as in Leeds itself, these dales 'well supplied with water, fuel, and cheap provisions,' and surrounded by sheep pastures yielding a fine lustrous wool, having been among the localities to which the woollen industry migrated at the close of the Middle Ages, when the expense of living hindered its prosperity on more ancient seats nearer London. In Wakefield and Halifax as well as in Leeds foreign artisans were settled by Henry VII. in 1489, and a generation later Halifax was already noted for its products in this branch of manufacture. When modern machinery was introduced the abundance of coal in the region served to stimulate the industry in those valleys still further, and many of the towns now engaged in the manufacture date their rise only from that period.

At the present day the centre of all branches of the worsted manufacture is Bradford, which is situated in a small basin among the hills to the west of Leeds and a little to the south of the Aire. Here the primary advantage seems to have been abundance of pure water suitable for the scouring of the wool, an advantage which the corporation of the town has taken care to preserve as the industry increased. The worsted industry is another of those industries in

which the abundance of capital is of peculiar importance. The combing of the wool is a highly specialised industry involving the use of complicated machinery, but employing mainly the labour of girls. Accordingly, to be carried on economically it must be carried on on a large scale. Bradford has likewise large silk, velvet, and plush mills (in which the raw material used is schappe or spun silk)—and close beside it on the Aire itself is the model town of Saltaire with its great alpaca works. Halifax in the Calder valley is now known for its lighter worsted fabrics, its baizes and carpets. Huddersfield on the Colne, a tributary of the Calder, though not even mentioned by Camden, is now pre-eminent in the manufacture of high-class fancy goods as well as plain fabrics. Dewsbury and Batley manufacture heavier fabrics, including blankets and shoddy. Wakefield, Barnsley, Keighley, Morley, Heckmondwike, and many others in this area are engaged in some branch of the great industry. Even on the west side of the Pennine Upland there are some towns that still carry on their old woollen manufactures. Rochdale has flannel mills, and Bury, Ashton, and Glossop all manufacture woollens of some kind ; Denton and Stockport have large felt hat factories.

The district in the west of England that early became known for its 'cloths' as distinguished from the 'stuffs,' for which the bulk of English wool was best adapted, still retains something of its renown in connection with this manufacture, and especially for the making of broadcloth. In some of the towns in which the industry was formerly pursued it has died out, but it still flourishes at Stroud in Gloucestershire and in the Stroud valley generally, and at Bradford and Trowbridge in the west of Wiltshire.

In the far north it is interesting to note that Kendal still retains something of the industry for which it was already known before the close of the fourteenth century, but in the east of England, where numerous towns were once noted for their woollen or worsted goods, even Norwich has lost nearly all its textile industries, although in virtue of the advantages due to its central situation in a fertile part of the country and to its still being accessible by sea, it continues to carry on important manufactures of one kind or another (mustard, starch, boots and shoes, agricultural implements, &c.).

Leicester, throughout its history as a manufacturing town, has been the chief seat of woollen hosiery in England, which is no doubt in a large measure due to the fact that the Leicestershire breed of sheep yields one of the finest wools for the making of worsted yarn, and more recently to its lying near a coal-field. The making of lace and elastic webbing has been added to its textile industries. Kidderminster in Worcestershire and Wilton in Wilts were for long celebrated for their carpets ; but it is to be noted that 'Brussels' carpets became the speciality of Kidderminster and the so-called

Kidderminster carpets are made chiefly in Scotland and the Yorkshire woollen districts.

In Scotland woollen manufactures form the staple industry mainly in certain towns in the basin of the Tweed, Hawick and Jedburgh, Galashiels, Selkirk, and Innerleithen, which are chiefly noted for the kind of fabric appropriately known as tweeds, in the making of which, however, they now have a rival in Dumfries, as well as in many of the Yorkshire manufacturing towns. The prosperity of some of these towns was greatly promoted at one time by the abundance of water-power afforded by the streams, but nowadays this source of power is not much used, and the continuance of the industry in the district is all the more striking from the fact that it lies remote from any productive coal-field. Though the counties of Roxburgh and Selkirk are said to carry more sheep per acre than any other part of the world, and this fact must have contributed greatly to the origin of the industry, the local supplies of wool no longer meet a tenth of the requirements. Besides tweeds, woollen hosiery is a large manufacture of this district. Of the two most important of the manufacturing towns mentioned, Galashiels and Hawick—both situated on one of the lines of railway from Edinburgh to Carlisle, Galashiels at the point whence a branch runs up the Tweed valley towards Glasgow—Hawick is specially devoted to this latter branch of the woollen industry. Hosiery is largely manufactured also at Dumfries, Edinburgh, and elsewhere, and carpets and other woollen goods are made at Glasgow, Ayr, Kilmarnock, Edinburgh, Perth, and Stirling. In general it should be noted that the woollen and worsted goods manufactured in all the outlying parts of the United Kingdom are of relatively high value, in the production of which cheap skilled labour compensates the lack of other advantages enjoyed by the West Riding.

In Ireland the woollen industry was checked by the repressive measures of the English Parliament at the close of the seventeenth century, but, as in England and Scotland, woollen goods of high quality are now made in many places in the country. The great textile industry of Ireland is, as it long has been, that of **linen.** In modern times this latter industry has undergone the process of concentration that has affected all others, and in Ireland the manufacture is now nearly confined to Belfast and the district around. In this district it first received an important stimulus at the end of the seventeenth century through the settlement of some Huguenot families, after the revocation of the Edict of Nantes, at Lisburn on the Lagan above Belfast. The linens of Belfast and the neighbourhood include those of the finest quality, and one great advantage enjoyed by the district for the production of such goods is the excellence of the spring water used in bleaching. For the finest linens flax is imported from Belgium, but large quantities are also

imported from Latvia, Estonia, Russia, as well as from Holland. In Scotland the chief centre of the linen manufacture is Dundee, but there, as well as in several eastern towns, it is chiefly the coarser linens that are manufactured, the raw material all coming from Baltic countries. This branch of industry has been mainly carried on in Scotland north of the Firth of Tay since the eighteenth century, and its predominance in those parts may perhaps be ascribed to the fact that the ports of that part of the country are the first reached by ships that round the north of Denmark. Dunfermline, in the west of Fife, has been noted for its damask table-linens since the early part of the eighteenth century. In England linen is an important industry in Manchester.

Jute yarns and tissues, though mainly exported from London, Liverpool, Glasgow, and other ports which carry on most of the trade with the countries requiring these materials for the making of sacking, are still manufactured most largely at Dundee, where the industry was first introduced in this country. In England, it has considerable importance at Barnsley.

The silk industry of the British Isles is almost confined to England, and is still pursued principally in the district where it was first firmly established, Derbyshire and the neighbouring parts of Staffordshire and Cheshire, where the streams furnish pure water, an important requirement of this manufacture. Derby, Ilkeston, and Chesterfield in the first-named county, Macclesfield and Congleton in Cheshire, Leek in north Staffordshire, are among the towns chiefly engaged in this pursuit. Leek is specially noted for its sewing thread and its silk-dye works, the water of the neighbourhood being among the best dyeing waters of Europe. Silks of one kind or another are also made in many other places. Coventry, once noted for its ribbons, now carries on a rapidly growing industry in artificial silk, though most of the woollen, cotton, and knitwear towns also engage in manufactures in artificial silk. Velvets and plushes, as already mentioned, are manufactured at Bradford (Yorks). The industry was introduced by the Huguenots into London, and the manufacture of silk was for long carried on there in Spitalfields and Bethnal Green.

The products of the various textile industries of which the chief seats have just been indicated made up (if we include apparel, millinery, &c.) in the period 1911–13 nearly 40 per cent. of the total value of the British exports of native produce and manufactures. In post-War years the proportion has dropped to between 25 and 30 per cent. Next came iron and steel and their products, which, if we include among them steam-engines and machinery of all kinds, hardware and cutlery, made up in the period 1911–13 very nearly 20 per cent. of the exports of the United Kingdom—in post-War years more.

The chief seats of **iron-smelting** are at and round Middlesbrough in the North Riding of Yorkshire and the south of Durham; in north Lancashire and Cumberland at Barrow, Workington, and other places supplied with red hematite from the neighbouring deposits: in Lincolnshire, especially north Lincolnshire (Frodingham and Scunthorpe), Northamptonshire and south Staffordshire; in the West Riding of Yorkshire; in South Wales at Port Talbot, Cardiff, and other places (though the inland industry is almost extinct); in Lanarkshire, at Airdrie, Coatbridge, and other places in the basin of the Clyde, and in north and east Ayrshire and at Falkirk (Carron works in the Forth basin). Unfortunately the Cumberland coal was not found generally suitable (until recently) for iron-smelting, and most of the fuel had to be brought to this district in the form of coke from the east of England, a distance of 75 to 100 miles. Both Cumberland and Lanarkshire are becoming increasingly dependent on Spanish ores.

The towns and seaports of Barrow and Middlesbrough have both risen into importance since about the middle of the nineteenth century through the working of the iron ores in their vicinity. The hematite ore near Barrow was held in high repute long before facilities existed for working it on a large scale. These facilities were first provided by the opening of a short line of railway from the quarries to the coast. Furnaces and ironworks rapidly rose up, and an excellent harbour has been simply formed by the enclosure of the channel between the mainland and the small island opposite. Middlesbrough, which is situated on the south side of the Tees, and accordingly in Yorkshire, owes its rise to a bed of iron ore, previously discovered in the valley of the Esk, near Whitby, being traced in 1850 to the vicinity of the present town. The situation of Middlesbrough being convenient for obtaining supplies of coke from north Durham and the Tyne, and of limestone, which crops out on the surface within a distance of 40 miles to the north-west, thus presented all the conditions for the establishment of a great iron industry. To make it at the same time a great seaport all that was necessary was to dredge the estuary of the Tees to a depth sufficient to admit large vessels, and to create a harbour protected from the waves of the North Sea. Both of these objects have now been accomplished, the latter by the construction of a breakwater, the material of which consists of the scoriæ from the neighbouring blast-furnaces. The ores for the iron industry of South Wales and Monmouthshire are now mainly of Spanish origin. The ports of Newport, Cardiff, and Swansea receive a large proportion of the iron ore imported into the United Kingdom, but this commodity also comes in large quantity to Glasgow and Ardrossan, Middlesbrough, and the Tyne ports.

The relative decline of the iron industry of the United Kingdom,

indicated by the figures on p. 265, reveals a growing competition on the part of other countries also in this department of British industry. In keeping with this, we find in recent years a tendency in the iron industry to become concentrated in the maritime centres of production, a fact which serves at once to mark in another manner the increasing keenness of competition, and to illustrate the advantage that Great Britain owes to its easily reached seaboard. Ironworks in the West Riding of Yorkshire, in Staffordshire, in Shropshire and around Merthyr Tydfil in South Wales have been transplanted to the coast. The excellent dock and river-side accommodation at Newport, together with the other advantages of that place, is attracting thither ironworks of various kinds from the Midlands. Another effect of the keen competition in this industry was an agreement under which the articles of iron and steel mostly used in engineering are produced in large quantity in standard sections, and a great economy thus secured in their production. The leading British purchasers of such articles agreed to order only the sections fixed by a committee appointed for the purpose. This favours the production of such articles at rolling-mills in the neighbourhood of the blast-furnaces, but the situation of iron and steel manufactures of a more advanced kind is influenced by other circumstances.

In connection with the manufacture of articles made from iron, two towns in England are specially noteworthy—Birmingham and Sheffield, both being towns which became engaged in the working of metals at a very early date, and have grown to a large size through the prosecution of such industries down to the present day.

Birmingham lies almost exactly in the middle of the low plateau between the rivers Trent, Severn, and Avon. The surrounding forests, together with abundance of iron ore in the neighbourhood, seem to have determined the form of the industry which grew up here. The smiths of Birmingham are mentioned as early as 1538. Under the name of Bremicham the town is described by Camden in 1607 as 'swarming with inhabitants, and echoing with the noise of anvils.' In 1727 its iron and hardware manufactures were estimated to employ or support upwards of 50,000 people. The local iron ore is no longer used; the 'Black Country' is no longer a country of blast furnaces belching forth smoke by day and lighting the sky with a lurid glare by night. But the heavy iron and steel industries have given rise to a great variety of metal manufactures especially of articles of small size. Birmingham and the whole of the adjoining parts of South Staffordshire, Worcestershire, and Warwickshire are crowded with large and small towns, Wolverhampton, Walsall, Wednesbury, West Bromwich, Dudley, the inhabitants of which are all mainly engaged in similar occupations—the making of all kinds of articles in metal as well as other goods especially associated with feeding the large local population of 1½ millions. All kinds of

domestic ironmongery are the chief products of this district, but motor-cars, engines and machinery, as well as needles, pins, and buttons, are also important articles of manufacture. Bromsgrove, Redditch, and Stourbridge in Worcestershire belong to the same group of towns in respect of the nature of the industry which they carry on. Redditch is the most important place of manufacture of needles in the world.

In all those regions where there are heavy industries relying on male labour there results a surplus of female labour. Consequently, light industries tend to become established in the same areas to absorb this female labour. The food industries of Birmingham (*e.g.* chocolate at Bournville) may be noted in this connection. Another good example is afforded by the corset-making industry of the dockyard town of Portsmouth.

Sheffield lies in a hollow in the extreme south of Yorkshire. The neighbourhood supplies both coal and iron (as well as water-power and excellent grindstones) long used in the making of cutlery, including fine cutting tools and the best tool-steel. A great stimulus was given to this industry by the discovery in 1740 by Huntsman, a Sheffield cutler, of the improved method of making cementation or crucible steel. But since the introduction of the Bessemer process of steel-making here in 1858 Sheffield has become the seat of steel industries on a much larger scale, making ships' plates, armour-plates, tyres and axles, ordnance, and all kinds of steel castings and forgings. For the finest work it has for hundreds of years imported the best raw material from Sweden.

Many other towns in England are known chiefly in connection with one or more branches of the iron and steel industry. The making of rails is a rolling-mill industry naturally carried on in the neighbourhood of the blast-furnaces, and especially those favourably situated for export, as at Middlesbrough and Barrow. Warrington, on the Mersey in Lancashire, produces iron wire, &c. The making of tin- and zinc-plate, a highly specialised industry of old standing and working partly for export, is concentrated especially at the industrial towns, and especially seaports, of the western end of the South Wales coal-field (Swansea, Llanelly, and Neath). The making of machinery for textile manufactures is carried on mainly, if not wholly, in some of the towns in which these manufactures form the staple industry. Cotton-spinning and weaving machinery is made at Manchester, Oldham, Bolton, Blackburn, Burnley, Bury, and other towns in the cotton-manufacturing district. In the same way machinery for the woollen industry is made in the woollen towns of Yorkshire—Leeds, Huddersfield, Bradford, and Keighley. Machinery for the manufacture of hosiery and other knitwear is made at Leicester and Nottingham.

Steam-engines and railway-carriages are made at Manchester,

Leeds, Birmingham, Glasgow, Newcastle, Darlington, and several smaller towns, where different railway companies have established such works for their own lines. The London, Midland and Scottish Railway has establishments of this kind at Crewe and Derby, the Great Western at Swindon in North Wiltshire, the Southern Railway at Eastleigh near Southampton and Ashford, the London and North-Eastern Railway at Doncaster, Darlington, and Gorton. In the selection of such places the companies have obviously been guided by the desire to find a place on their own line where land was cheap, rather than places in the vicinity of coal and iron supplies, which they can carry themselves at a minimum of cost.

Openshaw, a suburb of Manchester, has large manufactures of armour-plate, and other heavy steel castings of heavy guns and hydraulic and other machinery. Agricultural machinery and implements are made in many towns belonging to the corn-growing districts, as at Lincoln, Grantham, Gainsborough, Norwich, and Ipswich. These are all towns near the chief home market, sufficiently large to have convenient means of transport, and sufficiently small for land to be obtainable at a reasonable rate for the large areas required for such works. Chelmsford, Ipswich, Preston, and other seaports are becoming increasingly important as engineering centres, including electrical engineering.

An industry which has increased very rapidly in importance in recent years is the motor industry. In 1908 there were 65,000 cars and vehicles registered in Great Britain ; in 1922, 552,000 ; whilst in 1926 the million mark was reached. By 1935 the total exceeded 2·1 millions, representing one motor vehicle for every 18 persons (compared with 1 per 3·5 persons in the United States). In 1908 12,000 motor vehicles were manufactured in the United Kingdom ; in 1925, 153,000. In 1936 half a million were manufactured and 50,000 exported. In 1925 a quarter of a million were employed in the industry, ten years later nearly half a million. The industry is centred in the south-west and south-east midlands of England, especially at Coventry (where it has evolved from the earlier manufacture of bicycles), Birmingham, and Oxford. The industry is remarkable for the extensive use of electrical power. Closely connected with the motor industry is the rubber industry. The consumption of rubber in the United Kingdom was about 75,000 tons in 1929 and 100,000 tons in 1936. In 1930 over 5 million outer tyres were made.

Not very many years ago the Thames was the chief seat of shipbuilding in Great Britain, and it was the change from wood to iron as the material for that industry that transferred the industry to the Clyde and other northern rivers. Clydeside is now the chief seat of shipbuilding in the world—of shipbuilding in all its branches, including the making of marine engines. Shipbuilding

yards succeed one another for miles below Glasgow, and are met with at other places lower down, especially at Dumbarton and Greenock. Next to the Clyde in shipbuilding come the Tyne, the Wear, the Tees, and the Hartlepools and, in Ireland, Belfast. To a less extent the industry is carried on at Hull, Liverpool, Barrow-in-Furness, Dundee, &c. There are government dockyards at Chatham on the Medway, at Portsmouth and Devonport, and at Rosyth in Fifeshire, on the north side of the Firth of Forth just above the Forth Bridge. Ship-repairing is a distinct industry for which there are special facilities at the ports of the Tyne, London, Southampton, and Liverpool.

Coal and coke, the next articles to iron and its products among British exports of domestic origin, are chiefly exported from Cardiff, Newport, and Swansea, the outlets of the South Wales coal-field, and the Tyne ports (Newcastle and North and South Shields), Sunderland, and Hartlepool, the outlets of the Northumberland and Durham coal-fields, and from various ports on the Firth of Forth. The excellence of the so-called smokeless (that is nearly smokeless) coal furnished by the eastern part of the South Wales coal-field as fuel for steam-engines caused Cardiff to outstrip Newcastle in the export of coal to foreign countries, but Newcastle and Sunderland rank first among the ports which supply coal in coasting vessels for domestic use, their convenient situation for the supply of London being much in their favour. The actually smokeless coal known as anthracite is produced only in the western part of the South Wales field. The diminution in the demand for Cardiff steam coal accounts for the depression in the coal trade of South Wales.

Important among British exports of native produce and manufactures comes copper, with the various articles made out of that metal. As far back as the time of Queen Elizabeth, Swansea had a large business in the smelting of copper ores brought from Cornwall and Devon, the only English counties where this metal was found in great abundance. This business still continues, but nowadays not only copper ores, but also those of silver, zinc, lead, and sulphur, are brought hither from all parts of the world to be smelted, and more or less of the resulting metal is re-exported as British produce. Llanelly, in Carmarthenshire, shares in the industries of Swansea. In the making of articles from copper alloys, brass, bronze, &c., Birmingham takes the first place, as it does in all kinds of hardware ; but Rotherham, on the Don, is also noted for its manufacture of brass.

Metalliferous mining is almost dead in Britain : copper and tin ores were worked mainly in Cornwall and Devon. Only the best tin mines are still able to stand the competition of Malay tin. Lead was obtained most abundantly in the Isle of Man, the west of Durham, and other northern and central districts. The district round Wirksworth in Derbyshire has been worked since pre-Roman

times. In recent years the total value of metalliferous ores, other than iron, raised in Great Britain has been less than £1,000,000.

The making of earthenware and porcelain is another industry which involves a great consumption of fuel, and is hence carried on in this country mainly in coal-yielding districts. It is explained elsewhere (p. 281) why the making of the greatest variety of earthenware has come to be carried on mainly at Stoke-on-Trent in north Staffordshire, a county borough in which are now incorporated the former 'pottery' towns of Burslem, Tunstall, Hanley, Fenton, and Longton, as well as Stoke. Worcester and Derby have long been noted for their porcelain. Stourbridge makes a very hard kind of stoneware from fireclay found in the neighbourhood.

Glass also is made, for the same reason, chiefly on or close to the coal-fields, at St. Helens in Lancashire, at Birmingham, at Dudley and Stourbridge in Worcestershire, at South Shields, at Glasgow; glass bottles at Castleford, Doncaster, Rotherham, and other places in Yorkshire. As common salt is the chief material used in the making of 'alkali,' this product is largely made in the chief salt-yielding districts of England. Of these by far the most important is that in the valleys of the Weaver and Wheelock in Cheshire, with the towns of Northwich, Middlewich, Winsford, and Sandbach. Droitwich and Bromsgrove in Worcestershire, and more recently on both sides of the Tees (Port Clarence in Durham, Middlesbrough in Yorkshire), in north Lancashire (at Preesall, near Fleetwood, and on Walney Island), at Stafford, and elsewhere. The chief seats of the alkali works of the country are Widnes, at the head of the estuary of the Mersey, on the Lancashire side, and Flint, both near the Cheshire salt district; and works of the same kind exist on the south Durham salt district, at South Shields, also at St. Helens, Swansea &c. The great manufacture of dyestuffs which has sprung up since the War, being also one that uses large quantities of bulky raw materials, has its principal seats on water-ways—on the Thames, at Silvertown and elsewhere, on the Mersey and the Manchester ship canal, at and near Huddersfield, at Grangemouth on the Firth of Forth. The geographical distribution of the chemical industries has been profoundly influenced by the amalgamation of all the chief producers as the Imperial Chemical Industries, Limited, one of whose main centres is the new town of Billingham-on-Tees where there is a huge plant for making petrol from coal.

Ardeer, near Irvine, one of the most important centres in the country for the manufacture of explosives, is on a site deliberately chosen on a sandy foreshore, because while near a seaport the sand-dunes afforded a natural isolation for the different works of this dangerous industry. There are other sites of a similar type.

A few of the British industries in which a cheap supply of coal is of less importance than other requirements may now be noticed.

In the manufacture of paper a supply of pure water is for the most part essential, and hence this industry is mostly carried on in districts that still contain pure streams and at spots not far from the great markets (large towns). The vast quantities of cheap bulky material used in the industry also contribute to its localisation, favouring its growth at or near seaports well placed for the sale of its products, a situation of which the vast Gravesend and other Thames-side works form a good illustration. From the first introduction of paper-making into this country, the chief seats of the industry have lain in Kent (at Maidstone and elsewhere), and the manufacture is also largely carried on by the streams of Derbyshire and Mid-Lancashire (Darwen, Bacup, &c.), on the Kennet in Berkshire, in the Wycombe valley in Bucks, in Midlothian and Fifeshire. Dyeing (at least in the case of the more delicate shades) requires the same condition, and, where associated with bleaching, pure air is necessary over and above. It is hence characteristically an industry of small rather than large towns. Perth is the seat of some of the leading dye-works in the Kingdom ; Dumbarton, Accrington, and Bacup carry on turkey-red dyeing. Chair-making is a speciality of beech-growing districts of the Chiltern Hills, where the industry before the War employed 50,000 families. The making of different parts of chairs (seats in one district where the larger trees grow, and legs and the smaller parts where only small trees grow) is carried on domestically, the parts being merely put together in the towns (chiefly High Wycombe). Sugar-refining is carried on principally at three seaports—London, Liverpool, and Greenock. The refining of oil is an important new industry and is naturally carried on near, but not at, the leading ports. At Skewen, previously a barren area, near the town, oil refineries were erected in 1920 and connected with Swansea docks by pipes through which crude oil is pumped and refined oil returned for shipment.

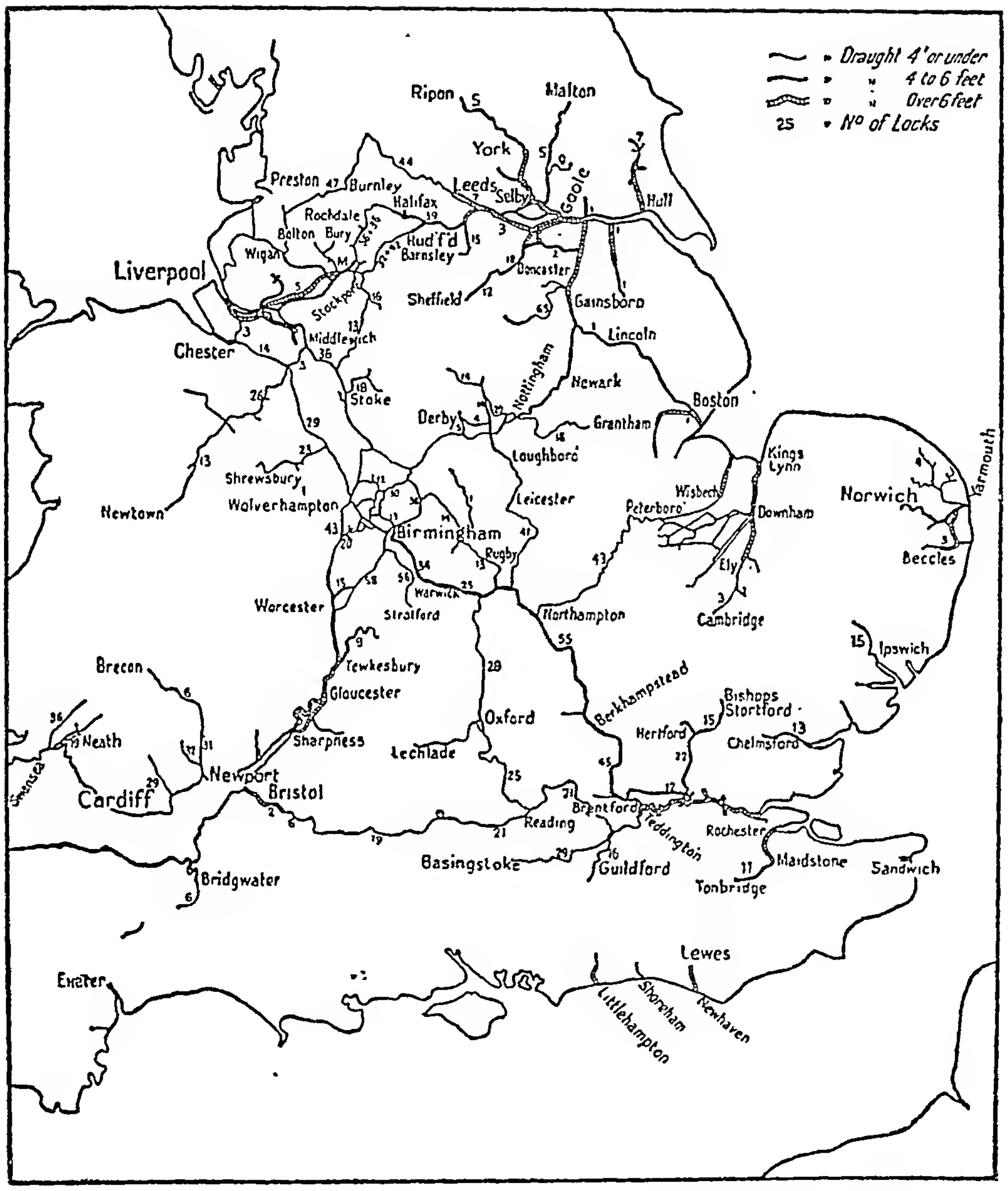
The making of shoes is the leading industry in Northampton, is among those of Leicester and Stafford, and is carried on to a greater or less extent in many other large towns of the country. The making of ladies' fancy shoes is the main survival of the old textile industry of Norwich. Until recently gloves were made at many small towns in agricultural districts, where labour was cheap, as at Worcester, Hereford, Woodstock in Oxfordshire, Taunton and Yeovil in Somersetshire, Great Torrington in Devonshire, Chester, &c. The making of hand-made lace is an industry in a similar position, still pursued at Honiton in south Devon, where it has been practised since the time of Charles I., in the vale of Aylesbury in Bucks, and elsewhere.

Transport and communication. In view of the nature of the chief industries of the country, it is a matter of much importance that the high grounds of England interfere comparatively little with the

facilities for locomotion. On all sides there flow down from the hills navigable rivers of greater or less length. In relation to internal communication the most important of these are the Ouse (Yorkshire), Trent, and Mersey, the Thames and the Severn with their tributaries. The Ouse is navigable for barges throughout its length, and its most important tributaries are navigable likewise or have been canalised. Although the number of locks renders them of little use now, three lines of canals have been laid across the Pennines, bringing the ports of Goole and Hull on the east into connection with those of Liverpool and Preston on the west. By the valley of the Aire a canal, which has a branch to Bradford, ascends by way of Leeds and Skipton, crosses the watershed at a height of only 477 feet, and descends on the Lancashire side by way of Burnley and Blackburn to Preston. By that of the Calder another line of canals ascends by way of Wakefield and Halifax, to descend by Rochdale to Manchester, where the Irwell becomes navigable. The third canal forms a more direct communication between the opposite sides of the Pennine Upland, but rises to a greater altitude. It joins Manchester with the Calder Canal by way of Ashton and Huddersfield. Its summit is at the height of 656 feet; the crossing at this altitude was effected only by piercing the Stanedge Tunnel, more than three miles in length.

From these particulars it might be inferred as a matter of course that canals in the lower regions of England are even more numerous, which is in fact the case. The Trent, the Mersey, the Thames, and the Severn are all interconnected by inland water-ways, natural or artificial. The Trent itself is navigable for small sea-going steamers as high as Gainsborough and since 1926 has been improved for barge traffic to Nottingham, the Thames for vessels of 200 tons as high as Hampton, and the Severn for vessels drawing 6 feet as high as Stourport. The Berkeley Ship Canal, which connects Gloucester with the estuary of the 'sandy-bottomed Severn,' enables vessels drawing more than 10 feet to ascend to that town, avoiding the windings and shallows of the river.

The canals of England are mainly works of the latter part of the eighteenth and the early part of the nineteenth century. The Bridgewater Canal, constructed under the direction of James Brindley, was completed in its eastern section (from the Earl, afterwards the Duke, of Bridgewater's coal-mines at Worsley to Manchester) about the end of 1761, but was not connected with the Mersey till 1776. At the period when they were made canals were of very high importance for the development of English industry and commerce. Since railways were introduced their value has been considerably diminished. They are still not without importance for the carriage of minerals and other bulky commodities, but even in the carriage of coal they are unable to compete with railways



NAVIGABLE WATERWAYS OF ENGLAND AND WALES, 1937.

except where the conditions are exceptionally favourable to this mode of transport. What specially favours the Aire and Calder navigation in it suse of the compartment boats described above on p. 102 is the fact that such boats can be used for the whole or nearly the whole distance between the coal-mines and the place of shipment at Goole. The greater the proportion of the tract of cheap haulage, the greater is the advantage. Actually also the surface of Britain is not suited to the construction of canals when compared with France or Germany—the surface is not mountainous but sufficiently hilly to involve a large number of locks. The railway companies have gradually acquired control of many of the canals of Britain ; many have fallen gradually into disuse and have been closed, though at the same time the Grand Union Canal Company's system, uniting London with the Midlands, has been improved since 1930 to accommodate 100-ton barges and has been partly provided with concrete banks. The map shows the canals in use in 1936. Beyond the northern limits of the map are the rivers Tees and Tyne. The former is navigable (draught over 6 feet) for 19 miles below Yarn ; the Tyne for 19 miles.

The most important of Scottish canals is the Forth and Clyde Canal, which enables small sea-going ships to pass from Grangemouth on the Firth of Forth to a place on the Firth of Clyde a little above Dumbarton. A ship canal with a minimum depth of 17 feet has been constructed through the long narrow valley called Glen More or the Great Valley, which connects Loch Linnhe and Loch Ness, and divides the Highlands of Scotland into two sections. It is called the Caledonian Canal, and is noteworthy as a work of engineering, but is not much used for the purpose for which it was designed—namely, to allow sea-going ships of moderate size to avoid the stormy passage through the Pentland Firth. The short Crinan Canal allows small steamers to pass from the Clyde to the west of Argyllshire without passing round the Mull of Kintyre.

Here it may be noted that an oil pipe-line capable of pumping 100 tons of oil per hour was opened in October 1918 between the Clyde and the Forth (Old Kilpatrick and Rosyth).

The estimated cost of construction of a canal for 100-ton barges is now between £40,000 and £50,000 per mile, and there is little inducement to undertake such expenditure.

The railway companies, quite apart from receiving no return for keeping canals open, are making an absolute loss on them. It is almost typical of the condition of many English canals that of the arguments brought forward to prevent the G.W.R. from abandoning the Kennet-Avon Canal one was that the farmers needed it for watering their cattle ; another that its abandonment would detract from the rural beauty of the quiet countryside. The loss to the

railway company in keeping this canal open was about £200,000 for the last ten years 1918–27. In 1921, which was a year of drought and in which many of the canals were short of water, the traffic originating on all the canals in the whole of Great Britain (excluding the Manchester Ship Canal) amounted to less than 12,000,000 tons of goods. During the next five years the canals failed to get back much of the traffic lost by the drought and in 1925 the corresponding figure was only 15,571,000 tons. In 1929 the tonnage had risen to 24,871,000, but by 1933 had fallen to 11,434,000 tons.

The success of the Manchester Ship Canal (opened 1894) (see p. 318) for a time stimulated the formulation of schemes for other ship canals. Several projects for ship or larger barge canals were subsequently started (Bristol to the Severn, Sheffield and Leeds to the Humber, the North Staffordshire potteries to the Mersey), but they have been mostly abandoned.

What has been said regarding the construction of canals implies that in railway construction the obstacles presented by the physical features of the country were of still less consequence relatively to the much higher value of the new means of transit. In view of the distribution of population, the most serious hindrances to railway communication are those presented by the Pennine Upland in the region already referred to under the head of canals, and those on the routes connecting the most populous parts of England with the most populous parts of Scotland. There are now railways on all the canal routes above mentioned. Farther south Manchester and Sheffield are connected by a line passing through the Woodhead tunnel, which is only a few yards shorter than the Stanedge and attains an altitude of over 1,000 feet. On the northern routes the chief connection between Lancashire and the valley of the Eden is now, as it always has been, by way of Shap Fell, where the summit level of the rails on the main L.M.S. or west coast route to Scotland is 916 feet above sea-level ; that between the West Riding of Yorkshire and the same valley reaches between the head-waters of the Ribble and Lune a height of 1,250 feet. The next high crossings on the northern routes are all in Scotland. In Glamorgan and Monmouthshire serious hindrances to communication are presented by the high ridges separating the populous coal-mining valleys in the west, more than one railway having to climb to an altitude of more than 1,200 feet within a short distance, involving gradients up to 1 in 45. Obstructions to communication presented by water have been overcome by low-level tunnels at the mouths of the Severn and the Mersey, and under the Thames at several places in London. The Severn tunnel, below Chepstow, the longest in the British Isles, is 4½ miles long. It was opened in 1886. A proposal to tunnel the Humber, thwarted by an adverse vote of a Committee of the House of Lords in 1873, was revived in 1907, but has not materialised.

Hull would thereby be brought half an hour nearer London. With reference to natural facilities for communication it is also noteworthy that the outline of England encourages railway construction, for it is obvious that the value of a railway, even for inland communication, is much enhanced by being connected with a seaport.

The Scottish railways are most closely laid in the Midland Valley, and through the valleys of the Southern Uplands wind several railways connecting with the lowlands on the other side and with England. The lowest of all these routes, that forming the shortest connection with England, is that by the east coast (the main L.N.E.R. route), which has nowhere to rise as much as 500 feet above sea-level. The next route, on the west, has first to climb to above 900 feet between Edinburgh and Melrose, and then to about 1,000 feet in crossing in a tunnel a spur of the Cheviots between Hawick and Liddisdale, where the main line descends to the Solway, and a branch passes eastwards to the head of the valley of the North Tyne. A still more westerly route (the main L.M.S. line) connects both Edinburgh and Glasgow with Carlisle, crossing, between the valleys of the Clyde and the Annan, an altitude of 1,028 feet. By winding far to the west, through Kilmarnock, a fourth line effects a crossing at a little more than 600 feet in height in passing from the valley of the Ayr to that of the Nith. The chief obstructions to communications offered by water in Scotland are overcome by means of two of the most remarkable railway bridges in the world, the Tay bridge at Dundee, the longest of all (3,593 yards, or a little more than two miles), opened in 1887, and the Forth Bridge at Queensferry, a few miles above Edinburgh, 2,765 yards, or more than a mile and a half long, opened in 1890.

Under the Railways Act of 1921 all the main railways of Great Britain were united into four groups with a view to economy of management. The Southern Railway embraces all the lines to the south of the Thames except those belonging to the former Great Western Railway which continues to exist for the most part as a separate group and the two serve the south-western peninsula. The Great Western Railway ramifies through the west of England and Wales. The London, Midland and Scottish Railway embraces the former London and North Western, Midland, and Lancashire and Yorkshire Railways. It also includes, north of Carlisle, the Glasgow and South Western, Caledonian, and Highland systems and is the largest of the systems. The London and North Eastern Railway embraces the former Great Northern, Great Eastern, and Great Central systems ; and, in Scotland, the North British and Great North of Scotland Railways.

Plans for the electrification of railways had before the War been adopted by the main companies, especially for London suburban

lines. On the Southern Railway nearly all the suburban lines have now been electrified. Since the War the electrification of main lines has engaged attention but only the Southern Railway has gone ahead with these main line schemes. The Southern Railway has now the largest electrified suburban system in the world, and has adopted the uniform third rail system.

During the War train-ferries operated between Richborough and Calais and Southampton and Dieppe. The Richborough installation has since come into private hands, and on October 11, 1921, the first commercial train conveyed by ferry, bringing about 300 tons of fruit from the south of France, arrived here. On April 24, 1924, a goods train-ferry from Harwich to Zeebrugge was formally opened, but it was left to the Southern Railway, in 1936, to inaugurate a through sleeping-car service for passengers to Paris *via* a train-ferry from Dover to Dunkerque. This followed the abandonment of long-considered schemes for a channel tunnel under the Straits of Dover.

The railways have suffered very severely from road competition, but have now, by Act of Parliament, acquired ' road powers,' and control or co-operate with many of the road transport companies.

British foreign trade. In early times and throughout the Middle Ages the great feature of English trade was the export of raw materials and the import of manufactured articles. By far the most important of the exported raw materials was wool, but it was only one of several, the export duties levied on which furnished a large part of the revenue of the crown. With the obvious intention of facilitating the collection of this revenue the regulation of this trade was attempted in the reign of Edward I., and the trade was more definitely organised by an ordinance of Edward III. in 1353. Therein the only staple commodities enumerated are wool, wool-fells (that is, sheep-skins with the wool on), leather or hides, and tin, but on other occasions lead, cheese, butter, alum, tallow, and worsted are also mentioned—the last, however, very seldom. The ordinance decreed that all these commodities should when exported be taken exclusively to certain English, Welsh, and Irish ports, where the duties were collected. The English ports included all those of any consideration on the east coast except Berwick-upon-Tweed, also Southampton and Exeter on the south coast, and Bristol on the west. The reason for the exception of Berwick-upon-Tweed from the list of English ports probably was that if it had been included under the regulations of the staple, English wool would have been smuggled across the Scottish Border and exported from some Scottish port. Sometimes Newcastle also was omitted from the staple towns. Carmarthen was the sole staple port for Wales. In Ireland there were four : Dublin, Waterford, Cork, and Drogheda. No external staple port was mentioned, although there had been a staple abroad

at various ports in the Low Countries at previous dates, and subsequently it was again found convenient to fix upon some external port as the one place beyond the seas to which all staple commodities should first be sent. From near the end of the fourteenth century till 1558 Calais was the sole external staple, but when the English lost Calais in that year the staple was transferred to Bruges. The trade in the staple commodities was mainly, but for one reason or another not at all times solely, in the hands of a privileged body known as the Staplers, who had a court of their own at Calais. The Staplers were mostly foreigners, and indeed several ordinances, including that of 1353, absolutely prohibited the trade in staple commodities to Englishmen, these being liable to smaller dues than foreigners. The loss that the revenue thereby incurred was one that the kings could not always afford, and one that was occasionally more than made good by the granting of special licences to Englishmen to engage in the staple trade even when there was a general prohibition. Such licences were of course obtained only on conditions that were advantageous to the Crown. Among the foreigners engaged in the staple trade of England were many Italians, but members of the Hanseatic League were still more conspicuous. The merchants belonging to this league had gained special privileges in the foreign trade of England before the close of the thirteenth century. In what was known as the Steelyard in London on the Thames, a site now partly occupied by Cannon Street Station, they had a well-protected residence with warehouses, and they had similar residences at some other English ports. Their privileges were for the most part maintained till 1598, when they were finally withdrawn by Queen Elizabeth.

Long before this, however, the trade of native English merchants had been growing through the efforts of an organised company known as the Merchant Adventurers. The name of 'adventurers' was given to those who traded in commodities not embraced by the regulations of the staple. English grain and honey could thus be freely exported to Norway and other parts in which such commodities found a market; but as English manufactures grew these became the most valuable commodities outside of the staple. Woollens accordingly came to be the chief wares whose sale abroad was pushed by the adventurers. When this body became a regularly organised society is uncertain, but in 1404 a charter was conferred upon it by Henry IV., and shortly after the company was enabled to establish its headquarters at Antwerp. Other charters were subsequently conferred upon it, and it grew to be an extremely influential body in the sixteenth and seventeenth centuries. Its headquarters were ultimately transferred to Hamburg, on which account it became known as the Hamburgh Company, but though its chief seat was thus abroad the membership was absolutely restricted to Englishmen.

In later days its special domain was all that part of the North Sea coast which lies between the Straits of Dover and the north of Denmark. It became, however, the parent or the model of several other merchant companies, which claimed, if they did not always enjoy, monopolies of trade elsewhere. Sebastian Cabot, who with his father John Cabot had made the first voyage from England to America in the search for a north-west passage to India in 1497, lived long enough to suggest to the Merchant Adventurers in the middle of the following century a voyage in search of a north-east passage to the same destination. The voyage was actually made in 1553 under Willoughby and Chancellor and led to the discovery of a route to the White Sea and the mouth of the Northern Dvina. In the same year a company known as the Muscovy Company received a charter conferring upon it privileges in the trade with Russia and Persia. In 1579 the Eastland Company obtained its first charter conferring privileges in connection with Scandinavian and Baltic trade. Afterwards the Levant or Turkey, the East India, and the Africa or Guinea Companies, as well as the Hudson's Bay Company, were successively founded. The most important of these for the future of England was of course the East India Company, which obtained its first charter on the last day of 1600, and subsequently to the implicit annulment in the Declaration of Rights in 1689 of all royal monopolies of trade, had a monopoly of the Eastern trade expressly conferred upon it by Parliament. This monopoly was retained for India till 1813 and for China till 1833. By this date the Company had become a great territorial power, and from 1833 it was nothing else.

Meanwhile the nature of English trade had completely changed. English manufactures had long been the principal exports. Throughout the eighteenth century woollens were the most important of these, and so jealously was any rivalry in this trade regarded that every effort was made to check the rise of a similar industry in Ireland. In the course of the eighteenth century cotton goods came to acquire more importance. They were among the goods which Bristol and other merchants carried from England to West Africa to be exchanged for slaves sold in the West Indies, whence the ships returned home with cargoes of sugar and other tropical produce, a highly lucrative trade not put an end to till January 1, 1808, when the slave trade was made illegal. At last came the revolution in industry which created a new era not merely for English commerce but for the commerce of the world, and which in England speedily had the effect of raising cotton manufactures to the first place among our exports. In recent times the practice of conferring royal charters on trading companies has been revived. Between 1880 and 1890 such charters were granted to the British North Borneo Company, the British South Africa Company, the

Royal Niger Company and the Imperial British East Africa Company, and the first two of these charters are still in force.

Bunker Coal Shipped at British Ports for use in External Trade

As the amount of coal shipped at British ports to meet the requirements of shipping engaged in the external trade of the United Kingdom gives a fair indication of the volume of that trade, the figures given below showing in millions of tons and decimals of a million the amount so shipped in some recent years, including two years in which there were great coal strikes (1912 and 1926) as well as years of war, will be of interest.

Years . . .	1901	1911	1912	1913	1916
Millions of tons .	13·59	19·26	18·29	21·03	12·99
Years . . .	1917	1918	1919	1920	1921
Millions of tons .	10·23	8·76	12·00	13·84	10·93
Years . . .	1922	1923	1924	1925	1926
Millions of tons .	18·26	18·16	17·69	16·45	7·59
Years . . .	1927	1928	1929	1930	1931
Millions of tons .	16·84	16·73	16·39	15·62	14·61
Years . . .	1932	1933	1934	1935	1936
Millions of tons .	14·21	13·46	13·49	12·53	—

It will now be worth while to examine in the light of the foregoing considerations the statistical tables given below setting forth the main features of British trade since 1871. First we note the high place which bulky articles take both in our import and export trade: among the imports timber, grain, ores; among the exports, above all, coal. To appreciate the importance of this fact, however, one must compare the table showing the total values of the commodities mentioned in the tables with the values per ton given in another table. That will enable one to understand how, for example, iron ores with their average value of less than £1 per ton, nearly the last of the commodities enumerated in order of value in the table of imports, must take a quite different place in an enumeration of British imports according to quantity. Still bulkier in proportion to value is coal, which in respect of quantity is by far the most important of British exports. The table given next summarises this position.

The export trade in coal is one of peculiar importance to Great Britain. Professor Jevons was, so far as I am aware, the first to point out what a large amount of our shipping is employed in the carriage outwards of this one commodity, and the fact was afterwards repeatedly emphasised by Sir Rawson Rawson, who made calculations on this head based on the assumption that four register

tons of shipping would be required to convey nine tons weight of coal. In 1898 coal was estimated to make up 86 per cent. of the

UNITED KINGDOM: IMPORTS BY QUANTITY

Commodities.	Units.	1913.	1922–5.	1926–30.	1931–35.
Wheat and flour[1]	mil. cwts.	121·2	117·6	115·7	117·6
Grain and flour, total	,,	220·7	183·4	182·1	204·4
Meat, except poultry	,,	23·3	29·6	30·3	31·5
Butter	,,	4·1	5·2	6·2	8·9
Margarine	,,	1·5	1·2	1·1	1·9
Lard	,,	2·0	2·4	0·1	1·5
Cheese, excluding margarine cheese	,,	2·3	2·9	3·0	2·9
Eggs	mil. great hun'ds.	21·6	19·0	24·8	20·6
Fish, not canned	mil. cwts.	2·7	2·9	3·9	2·6
,, canned	,,	1·0	1·0	1·2	1·3
Potatoes	,,	9·4	6·8	6·7	8·6
Sugar, entered for consumption	,,	34·6	34·7	37·4	40·7
Tea ,, ,, ,,	,,	2·7	4·1	5·3	4·6
Coffee ,, ,, ,,	,,	0·3	0·5	0·7	0·6
Wine	mil. gall.	10·4	15·4	15·8	14·5
Tobacco, retained for consumption	mil. cwts.	0·9	1·5	1·3	1·4
Iron ore	mil. tons	7·4	4·9	4·3	3·1
Petroleum, crude	mil. gall.	1·1	396·3	529·5	414·0
Pit props, or pit wood	mil. loads	3·5	3·0	2·5	2·0
Cotton, raw	mil. centals[2]	21·7	15·6	15·1	12·6
Wool, sheep and lamb's	mil. ,,	8·0	7·8	8·0	8·7
Jute, raw	mil. cwts.	7·0	3·1	0·2	0·2
Wood pulp	,,	19·6	22·6	28·9	38·9
Rubber, crude	mil. centals	1·6	1·7	3·4	3·2
Iron and steel manufactures	mil. tons	2·2	1·6	3·3	1·6
Leather	mil. cwts.	1·2	0·8	0·2	0·1

EXPORTS BY QUANTITY: BRITISH PRODUCE AND MANUFACTURES

Commodities.	Units.	1913.	1922–5.	1926–30.	1931–35.
Herrings	mil. cwts.	8·8	4·7	5·4	3·1
Coal	mil. tons.	73·4	64·1	47·4	39·8
China clay and china stone	,,	0·6	0·6	0·6	0·4
China and earthenware	mil. cwts.	3·5	1·6	1·8	1·2
Cement	,,	15·0	11·5	17·4	11·5
Iron and steel manufactures	mil. tons	5·0	3·8	3·8	2·1
Tinned plates	,,	*0·5*	*0·5*	0·5	0·4
Textile machinery	,,	*0·2*	*0·1*	0·1	0·06
Cotton yarns	mil. cwts.	1·9	1·6	1·5	1·2
,, piece-goods	Hundred mills. of sq. yards	—[3]	43·0	35·8	19·8
Wool tops	mil. centals	0·4	0·4	0·3	0·5
Woollen tissues	Hundred mills. of sq. yds.	—[3]	1·4	1·1	0·9
Worsted ,,	,,	—[3]	0·6	0·4	0·3
Linen ,,	,,	—[3]	0·9	0·7	0·7
Jute yarn	mil. cwts.	0·4	0·4	0·5	0·2
,, piece-goods	Hundred mills. of sq. yds.	—[3]	1·6	1·6	1·0
Boots and shoes	mil. doz. pairs	1·5	0·9	1·0	0·5
Coal tar dyes and dyestuffs	mil. cwts.	0·1	0·1	0·1	0·09
Soap	,,	1·8	1·4	1·5	1·0
Printing paper	,,	1·9	2·8	3·1	2·3
Ships	mil. tons gross	0·5	0·4	0·4	0·4

[1] Flour reckoned as = 1·28 wheat.
[2] Each = 100 lbs.
[3] In 1913 these goods were entered by yards, not by square yards.

total weight of British exports. Professor Jevons also pointed out the indirect importance of this traffic to the commerce of the United Kingdom, through the fact that the ships that go out laden with coal are ready to bring back cargoes of foreign goods at low freights.

It should also be noted that a large part of the coal exported by this country is for the use of steamers coaling abroad, the greater proportion being British steamers. This coal trade is regarded by some with little satisfaction. It is considered by them that it would be better to retain for ourselves the raw material on which the manufacturing industry of the country so largely depends. They look forward to a time when our coal will be used up or become too scarce and dear to be economically useful. But there is known to be enough coal in this country to last, at the present rate of consumption, for 800 years, and the difficulties of the post-War years have been caused largely not by any exhaustion of resources but to the diminution of the foreign demand for British coal.

When we reflect that all our external trade as well as much of our internal trade is necessarily carried on by sea, and that that trade involves such an enormous quantity of bulky cargoes both outwards and inwards, it is obvious that we have here one important cause that must tend to promote British shipping, the magnitude of which has already been referred to. When we consider also our local advantages for the building of steel ships and their engines, and the large proportion of our maritime population, the great preponderance of British shipping is not surprising.

Another striking feature of British trade is the large and increasing excess of the value of the imports over the exports, amounting on the average of the five years 1906 to 1910 to £142,000,000 ; in 1913 to £158,000,000 ; in 1924 to £341,000,000 ; in 1930, £387,300,000 ; in 1935, £275,000,000. The explanation of this is found in what have come to be known as invisible exports, that is, economic services rendered by the people of this country to other countries for which those who render such services are entitled to be paid. The most important of these are loans to foreign countries and British possessions and the earnings of British shipping on foreign or colonial account. Much uncertainty is indeed introduced into these estimates by the fact that registration of shipping under a certain flag does not prove that the shipping is all owned by subjects of the nation to which that flag belongs, and that loans to countries abroad issued in the United Kingdom are not all held by residents in this country, but may and often do include large sums lent by foreigners. Much shipping under foreign flags is owned by British subjects, but, on the other hand, some foreign capital is invested in British ships. Thus, in 1902 the International Mercantile Marine Company was incorporated at Trenton, New Jersey, and acquired the control of most of the chief British Atlantic steamship lines, whose ships, however, retained British registration, although the British holding in the company amounted to only £13,000,000 against an American holding of £21,000,000. The British lines transferred to the company were the White Star, Dominion, America

and Leyland lines. The principal British company trading with the United States remaining outside the International Company was the Cunard Company, with which about the same time the British Government made an agreement that, on condition of its remaining a purely British undertaking for twenty years, holding for that term all its vessels at the disposal of the British Government on agreed terms, agreeing 'not to unduly raise freights' or give preferential rates to foreigners, and undertaking to 'build two large steamers for the Atlantic trade of high speed,' the British Government would lend the money to build the ships, and from the time when the ships began to run would pay to the company an annual subvention of £150,000. In 1926 the White Star Line was repurchased by British interests for £7,000,000 and later merged with the Cunard. With Government help the Cunard White Star Line launched the *Queen Mary* in 1936. Large sums are also earned in this country by banking and insurance business transacted on account of residents abroad, and by the management of businesses whose earnings are derived from abroad, an item which must be distinguished from the mere return on foreign investments, for all office expenses on businesses must be deducted before dividends are declared. Difficult as it is to form precise estimates under all these heads, the aggregate earnings thus indicated are undoubtedly very great. In 1914 Sir George Paish stated that his own calculation was that we received something like £340,000,000 or £350,000,000 from abroad. That was made up as to rather over £200,000,000 of interest, as to over £100,000,000 from shipping, and as to the balance of about £30,000,000 or £40,000,000 from these miscellaneous sources. Estimates of the invisible exports are published in the *Board of Trade Journal*. Expressed in millions of pounds sterling the figures given are: 1913, 339; 1920, 595; 1922, 325; 1923, 305; 1924, 435; 1925, 449; 1926, 465; 1927, 504; 1928, 495; 1929, 504; 1930, 431; 1931, 304; 1932, 255; 1933, 260; 1934, 287; 1935, 295; 1936, 330. Of these totals overseas investments yield roughly half, shipping about one-third.

When we look at the items of which our imports are made up we cannot but be struck at the very high proportion of food-stuffs. Among these wheat has remained comparatively steady between 5 and 7 in percentage value, and flour, before the War, dropped in absolute value owing to the diminishing proportion of the total wheat supply from North America. Meat, butter and eggs, fruits and nuts all increased steadily in the proportion which they had to the whole value of our imports up to about 1905. Since then the proportion has been steady or fluctuating. Prior to 1913 three other items show a rapid rise in relative importance—rubber, cotton manufactures, and iron and steel manufactures. The cause of the rapid rise in the import of rubber is known to everyone. The

increase before the War in the import of cotton manufactures was striking—mainly printed or dyed goods—chiefly from Germany, followed by France and Belgium. The iron and steel imports are mainly of half-manufactured articles of which there is little or no waste in further manufacture, forming the raw material of higher branches of industry.

As to the origins of the imports, the attention of the reader is drawn to the note on the table showing these origins ; but we may note here that the most striking relative advance is shown by the Argentine Republic and that from 1886 to 1913 the group Germany, Netherlands, and Belgium was stationary in relative importance. Most notable features of the post-War trade would seem to be the continued strong ties between Britain and the Empire and the decrease with America.

No less striking than the high place taken by food-stuffs among British imports is the uniform and remarkable preponderance of cotton manufactures among the exports, even though their relative importance has been slowly diminishing. It has already been pointed out that this preponderance is at least in large part due to the great commercial advantages of Great Britain, the special facilities that this country has for reaching all those parts of the world most easily reached from the seaboard, combined with the fact that cottons are in universal demand and this country has a world-wide trade in bulkier articles. And in connection with this it should be added that this country makes use of all its great ports in disseminating its cottons. In any one year the proportion of the value of cotton manufactures and yarns exported from the two ports of Liverpool and Manchester is only about two-thirds of the whole, leaving one-third to be exported by London, Southampton, the Humber ports, Glasgow, Harwich, and others. No ship ever leaves Liverpool entirely laden with cotton goods. A cargo of 500 tons of such goods is considered a very good lading for a ship with a total cargo of 3,000 tons. The very magnitude of the trade promotes it still further through being favourable to a high degree of organisation, which is further favoured by the remarkable concentration of the industry (see p. 316). The export of iron and steel manufactures is also a remarkable illustration of the commercial advantages of this country, especially when we consider the relative advance of other countries in the conditions favouring the initial stages of the industry, and the remarkable recovery since the period 1891–95. In 1886–90 the United States took about three-fourths of the value of the tinned plates exported from this country, one of the most important articles under this head. Now the import of tinned plates in that country is comparatively small, but the loss under this and other heads has been largely made good in widely scattered markets. It may be pointed out that iron and steel manufactures

UNITED KINGDOM

GENERAL IMPORTS, EXCLUDING DIAMONDS AND BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.									Change % 1924 on 1911–13.	
	1871–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	1924.	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	1924.	Value.	Quant.
Grain and flour[1]	53·75	62·67	53·12	57·79	61·08	67·61	75·29	83·25	121·51	14·9	15·7	13·6	13·8	12·9	12·5	12·0	11·4	9·5	+ 46	− 44
Wheat	26·15	28·24	21·47	23·33	23·36	29·93	39·55	43·07	69·60	7·2	7·0	5·5	5·6	4·9	5·5	6·3	5·9	5·4	+ 61	+ 12
Maize	7·48	8·62	8·10	8·30	11·04	11·57	11·88	12·69	17·06	2·1	2·2	2·1	2·0	2·3	2·1	1·9	1·7	1·3	+ 34	− 14
Wheat meal and flour	4·79	10·40	9·08	9·58	10·24	8·46	6·49	5·71	8·33	1·3	2·6	2·3	2·3	2·1	1·6	1·0	0·8	0·7	+ 46	+ 3
Raw Cotton	52·19	43·29	41·34	35·61	34·25	46·97	62·81	73·99	121·54	14·4	10·8	10·6	8·5	7·2	8·7	10·0	10·1	9·5	+ 64	− 32
Meat	12·94	25·36	25·55	31·41	41·22	49·41	49·97	51·84	104·60	3·6	6·3	6·6	7·5	8·7	9·1	7·9	7·1	8·2	+ 102	+ 33
Fresh beef and mutton	—	3·13	4·63	8·06	11·59	15·54	18·92	23·69	52·12	—	0·8	1·2	1·9	2·4	2·9	3·0	3·2	4·1	+ 120	+ 31
Bacon and hams	5·21	9·19	9·02	10·68	13·65	16·80	17·32	18·39	45·02	1·4	2·3	2·3	2·6	2·9	3·1	2·8	2·5	3·5	+ 145	+ 67
Animals	5·37	9·72	8·46	8·60	10·27	9·54	6·89	1·72	22·08	1·5	2·4	2·2	2·1	2·2	1·8	1·1	0·2	1·7	+1183	+1730
Wool, sheep, alpaca, &c.	20·11	24·73	25·76	26·24	23·97	21·53	31·00	33·74	70·70	5·6	6·2	6·6	6·3	5·1	4·0	4·9	4·6	5·5	+ 109	− 4
Butter and margarine	7·51	11·72	12·55	16·11	19·10	23·20	25·82	27·64	51·40	2·1	2·9	3·2	3·9	4·0	4·3	4·1	3·8	4·3	+ 97	+ 22
Wood, total	16·75	16·40	15·76	16·72	23·84	24·76	25·74	29·34	51·07	4·6	4·1	4·0	4·0	5·0	4·6	4·1	4·0	4·0	+ 74	—
Sugar	20·36	22·42	18·19	19·71	17·77	17·45	20·54	24·93	44·12	5·6	5·6	4·6	4·7	3·7	3·2	3·3	3·4	3·5	+ 77	− 5
Refined	3·69	4·35	6·76	9·85	10·69	10·86	12·04	13·36	16·03	1·0	1·1	1·7	2·4	2·2	2·0	1·9	1·8	1·3	+ 19	− 33
Raw	16·67	18·07	11·43	9·86	7·08	6·59	8·50	11·58	20·09	4·6	4·5	2·9	2·4	1·5	1·2	1·3	1·6	1·6	+ 74	+ 19
Rubber	1·62	2·58	2·67	3·34	5·73	7·02	13·88	20·15	9·66	0·4	0·6	0·7	0·8	1·2	1·3	2·2	2·8	0·8	− 52	—
Silk yarn and manufrs.[2]	10·58	11·21	11·36	12·85	16·51	13·48	12·95	13·95	25·21	2·9	2·8	2·9	3·1	3·5	2·5	2·1	1·9	2·0	+ 81	—
Oil-seeds and nuts	7·60	8·47	7·46	7·28	6·83	8·69	11·97	14·66	52·14	2·1	2·1	1·9	1·7	1·4	1·6	1·9	2·0	4·1	+ 256	—
Hides, skins and furs, raw	6·72	6·63	6·24	6·52	7·12	7·61	11·08	13·29	21·24	1·9	1·7	1·6	1·6	1·5	1·4	1·8	1·8	1·7	+ 59	—
Hides	4·46	3·70	3·07	2·35	2·82	2·35	3·46	5·08	6·66	1·2	0·9	0·8	0·6	0·6	0·4	0·5	0·7	0·5	+ 31	+ 6
Sheep and goat skins	1·24	1·40	1·72	2·44	2·64	3·10	4·36	4·28	5·64	0·3	0·4	0·4	0·6	0·6	0·6	0·7	0·6	0·4	+ 32	—
Tea	12·24	10·98	10·24	10·18	10·52	9·32	10·88	13·30	40·57	3·4	2·7	2·6	2·4	2·2	1·7	1·7	1·8	3·2	+ 205	+ 11
Chemicals	9·91	11·61	9·67	8·64	8·42	9·15	10·76	12·29	14·70	2·8	2·9	3·0	2·1	1·8	1·7	1·7	1·7	1·2	+ 19	—
Coal tar dyes	—	0·46	0·57	0·59	0·72	1·13	1·63	1·82	1·35	—	0·1	0·1	0·1	0·2	0·2	0·3	0·2	0·1	− 25	—
Fresh fruit and nuts	2·75	4·37	4·65	5·74	7·08	9·46	10·48	10·85	31·95	0·8	1·1	1·2	1·4	1·5	1·7	1·7	1·5	2·5	+ 191	—
Woollen yarn and manufactures to 1903[2]	5·67	8·40	11·07	12·11	12·23	12·45	—	—	14·87[3]	1·6	2·1	2·8	2·9	2·6	2·4	—	—	1·2	+ 47	—
ex. apparel from 1904	—	—	—	—	—	11·74	10·34	10·06	—	—	—	—	—	—	2·1	1·6	1·4	—	—	—
Cotton yarn and manufs.[3]	—	—	—	4·19	5·63	7·38	9·95	11·68	9·31	—	—	—	1·0	1·2	1·4	1·6	1·6	0·7	—	—
Leather	2·82	5·35	6·02	6·95	8·08	8·13	9·41	10·73	13·53	0·8	1·3	1·5	1·7	1·7	1·5	1·5	1·5	1·1	+ 26	− 33
Iron and steel manufactures	—	—	4·24	4·34	5·60	8·19	8·06	13·11	22·38	—	—	1·1	1·0	1·2	1·5	1·3	1·8	1·7	—	+ 22
Machinery					3·14	4·40	4·78	6·62	10·52					0·6	0·8	0·8	0·9	0·8	+ 59	− 33
Eggs	2·08	2·66	3·12	3·79	4·69	6·39	7·19	8·65	18·63	0·6	0·7	0·8	0·9	1·0	1·2	1·1	1·2	1·5	+ 115	+ 2
Flax and hemp, raw, and tow	7·52	5·51	5·49	5·20	5·43	7·27	7·09	8·38	9·75	2·1	1·4	1·4	1·2	1·1	1·3	1·1	1·1	0·8	+ 16	− 34
Cheese	3·93	4·79	4·48	5·11	5·62	6·38	6·97	7·20	13·57	1·1	1·2	1·1	1·2	1·2	1·2	1·1	1·0	1·1	+ 88	+ 25
Tin	1·13	2·23	2·81	2·71	2·59	4·68	6·90	8·99	4·14	0·3	0·6	0·7	0·6	0·5	0·9	1·1	1·2	0·3	− 54	—
Copper	3·28	2·29	2·36	2·10	4·01	4·77	6·88	6·93	10·29	0·9	0·6	0·6	0·5	0·8	0·9	1·1	0·9	0·8	+ 48	—
Iron ores	0·85	2·45	2·71	2·78	4·65	4·87	5·98	6·24	8·52	0·2	0·6	0·7	0·7	1·0	0·9	0·9	0·9	0·7	+ 37	− 13
Average total value	360·20	399·60	389·60	417·80	474·30	541·80	629·90	731·20	1279·85											

[1] Excluding locust-beans from 1901, value 1901–5 £0·20, 1906–10 £0·23; including lentils from 1902, value 1902–5 £0·05, 1906–10 £0·08 million.
[2] Apparel is a separate item from 1903, formerly included under silks, woollens, &c., value 1906–10 £3·28 million.
[3] Including apparel in 1924.

UNITED KINGDOM

IMPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Raw Materials . . .	*23·3*	*25·4*	*24·6* [1]
Raw Cotton . . .	9·5	6·0	4·6
Raw wool . . .	5·5	4·7	4·9
Wood and wood pulp .	4·0	4·8	5·5
Petroleum . . .	—	3·6	4·2
Rubber	0·8	1·7	0·9
Hides, skins and furs .	1·7	2·2	2·1
Zinc, lead, tin, copper, iron ores	1·8	2·4	1·8
Oil-seeds and nuts . .	4·1	1·4	1·5
Foodstuffs	*37·9*	*31·7*	*37·0* [1]
Meat	8·2	9·5	12·2
Fresh beef and mutton .	4·1	4·0	5·5
Bacon and hams . .	3·5	4·4	4·5
Animals . . .	1·7	1·1	1·2
Grain and flour . .	9·5	8·3	8·7
Wheat . . .	5·4	5·0	4·1
Maize . . .	1·3	1·1	1·5
Wheat meal and flour .	0·7	0·6	0·5
Butter	4·3	4·2	5·2
Tea	3·2	3·1	3·6
Sugar	3·5	2·0	2·0 (Sugar, Raw and Refined)
Raw	—	1·6	
Refined	—	0·4	
Fresh fruit . . .	2·5	2·9	4·0
Eggs	1·5	1·4	1·2
Cheese	1·1	1·2	1·1
Tobacco	1·2	1·4	1·7
Manufactures . . .	*8·7*	*10·6*	*14·4* [1]
Silk yarns and manufrs. .	2·0	1·2	0·6
Wool yarns and manufrs.	1·2 (Wool yarns and Apparel)	0·9	0·6
Apparel		1·6	1·3
Cotton yarns and manufrs.	0·7	0·8	0·5
Iron and steel manufrs. .	1·7	2·3	1·5
Machinery manufrs. .	0·8	1·4	1·6
Leather manufrs. . .	1·1	1·2	1·1
Chemicals . . .	1·2	1·3	1·0
Paper and cardboard .	—	1·5	1·8
Total in £ millions . .	1279·8	1184·5	745·5

[1] Classes for 1931–4 only

UNITED KINGDOM

EXPORTS OF NATIVE PRODUCE AND MANUFACTURES

Principal Articles.	Average Value in Millions Sterling.									Percentages.									Change% 1924 on 1911–13.	
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	1924	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	1924	Value	Quant.
Cotton manufactures[1]	75·26	74·20	71·35	66·29	67·11	79·13	100·88	123·15	199·30	31·3	31·9[1]	30·2	29·2	26·9	27·2	26·0	25·6	24·9	+ 62	—
Yarn	*15·00*	*13·04*	*11·72*	*9·70*	*8·94*	*8·41*	*13·05*	*15·63*	*27·79*	*6·2*	*5·6*	*5·0*	*4·3*	*3·6*	*2·9*	*3·4*	*3·3*	*3·5*	+ 78	−28
Thread	*1·52*	*2·39*	*2·89*	*3·04*	*3·52*	*3·60*	*4·45*	*3·87*	*6·96*	*0·6*	*1·0*	*1·2*	*1·3*	*1·4*	*1·2*	*1·1*	*0·8*	*0·9*	+ 79	—
Iron and steel	30·94	26·43	26·28	21·22	25·92	29·09	41·83[2]	49·97	74·53[6]	12·9	11·4	11·1	9·4	10·4	10·0	10·8	10·4	9·3	—	−19
Coal, coke, &c.	10·30	10·09	13·03	16·58	22·33	27·62	38·03	44·90	78·31	4·3	4·3	5·5	7·3	9·0	9·5	9·8	9·3	9·8	+ 74	−27
Woollen manufactures	—	—	—	24·39	24·18	24·79	32·81	38·28	67·79	—	—	—	10·7	9·7	8·5	8·4	8·0	8·5	+ 77	—
Tissues	*25·87*	*18·83*[1]	*20·41*	*17·30*	*15·68*	*16·59*	*21·52*	*25·79*	*41·19*	*10·8*	*8·1*[1]	*8·6*	*7·6*	*6·3*	*5·7*	*5·5*	*5·4*	*5·2*	+ 59	+62
Yarn, woollen and worsted	*5·65*	*3·63*	*4·17*	*4·52*	*4·91*	*3·93*	*5·50*	*5·95*	*13·46*	*2·3*	*1·5*	*1·8*	*2·0*	*2·0*	*1·4*	*1·4*	*1·2*	*1·7*	+126	−12
Yarn, alpaca, mohair, &c.	—	*0·99*	*1·66*	*1·40*	*1·71*	*1·76*	*2·32*	*2·45*	*2·04*	—	*0·4*	*0·5*	*0·6*	*0·7*	*0·6*	*0·6*	*0·5*	*0·3*	− 17	−48
Tops	—	—	—	*0·70*	*1·46*	*2·07*	*2·92*	*3·37*	*6·47*	—	—	—	*0·3*	*0·6*	*0·7*	*0·8*	*0·7*	*0·8*	+ 92	− 2
Machinery and engines	8·60	11·89	13·18	14·60	18·19	20·19	29·37	33·71	44·70	3·6	5·1	5·6	6·4	7·3	6·9	7·6	7·0	5·6	+ 92	−35
Chemicals, drugs, dyes	7·48	9·73	10·01	11·52	12·16	13·32	16·84	21·02	25·50	3·1	4·2	4·2	5·1	4·9	4·5	4·3	4·3	3·2	+ 21	—
Coal products, not dyes	*0·38*	*0·86*	*0·96*	*1·40*	*1·68*	*1·31*[3]	*1·53*	*2·26*	—	*0·2*	*0·4*	*0·4*	*0·6*	*0·7*	*0·4*	*0·4*	*0·5*	—	—	—
Linen yarn and manufactures	9·46	6·52	6·45	5·91	5·85	6·48	8·26	9·40	13·32	3·9	2·7	2·7	2·6	2·3	2·2	2·1	1·9	1·7	+ 42	—
Apparel & haberdashery	9·16	7·42	6·73	6·15	6·48	7·08	7·02	10·26	30·04[7]	3·8	3·1	2·8	2·7	2·6	2·4	1·8	2·1	3·8	+192	—
Leather manufactures, including boots	3·65	4·04	3·97	3·84	3·86	4·77	6·14	8·51	12·32	1·5	1·7	1·7	1·7	1·5	1·6	1·6	1·8	1·5	+ 44	—
Hardware, implements, &c.	—	4·78	4·39	3·70	3·97	4·64	5·08	6·73	8·50	—	2·1	1·9	1·6	1·6	1·6	1·3	1·4	1·1	+ 26	—
Cutlery and hardware	*4·54*	*3·54*	*2·94*	*2·09*	*2·10*	*2·11*	*2·19*	*2·38*	*2·40*	*1·9*	*1·5*	*1·2*	*0·9*	*0·8*	*0·7*	*0·6*	*0·5*	*0·3*	+ 1	—
Fish	1·26	1·89	1·67	1·89	2·51	3·56	4·85	6·88	8·44	0·5	0·8	0·7	0·8	1·0	1·2	1·2	1·4	1·1	+ 22	−21
Earthenware and glass	—	—	—	2·74	2·87	3·13	3·89	4·97	12·85	—	—	—	1·2	1·2	1·1	1·0	1·0	1·6	+158	—
China	—	—	—	*1·83*	*1·78*	*1·81*	*2·22*	*2·86*	*6·56*	—	—	—	*0·8*	*0·7*	*0·6*	*0·6*	*0·6*	*0·8*	—	—
Copper and yellow metal	2·97	3·40	3·22	3·16	2·91	3·37	3·66	3·31	5·08	1·2	1·4	1·4	1·4	1·2	1·2	0·9	0·7	0·6	+ 53	−20
Jute yarn and manufactures	1·68	2·60	2·57	2·71	2·52	2·62	3·25	3·54	5·78	0·7	1·1	1·1	1·2	1·0	0·9	0·8	0·7	0·7	+ 63	—
Spirits[4]	0·21	0·81	1·12	1·36	2·01	2·73	3·14	4·07	11·63	0·1	0·3	0·5	0·6	0·8	0·9	0·8	0·8	1·5	+186	—
Electrical goods, excluding machinery	—	—	—	—	—	2·74	2·63	4·18	10·10	—	—	—	—	—	0·9	0·7	0·9	1·3	+142	—
Books	0·87	1·15	1·23	1·28	1·38	1·74	2·10	2·78	4·20	0·4	0·5	0·5	0·6	0·6	0·6	0·5	0·6	0·5	+ 51	+ 2
Silk yarn and manufactures	3·34	3·07	2·81	1·89	1·81	1·77	2·08	2·25	2·19	1·4	1·3	1·2	0·8	0·7	0·6	0·5	0·5	0·3	− 3	—
Beer and ale[4]	2·18	1·74	1·74	1·57	1·65	1·75	1·79	2·08	1·25	0·9	0·7	0·7	0·7	0·7	0·6	0·5	0·4	0·2	− 40	−60
Average aggregate value	239·50	232·30	236·30	227·00	249·10	291·10	388·70	481·00	789·84											
New ships from 1899	—	—	—	—	8·89	5·84	8·79	7·91	5·52											
Average total value	—	—	—	—	—	297·00	397·50	488·90	795·36											

[1] Large quantities of piece goods of mixed materials in which wool predominated were erroneously entered as cotton prior to 1884, annual value about £500,000.
[2] In 1906–10 'iron and steel' includes 'tyres, wheels, axles' to the value of £1·08 million, also small amount of old rails and telegraph wire.
[3] Peat and shale products (naphtha, paraffin, &c.) excluded in 1901, annual value about £500,000. [4] Ex-ship stores.
[5] Telegraph wire was transferred in 1903 to 'iron and steel.' [6] Iron, steel + manufactures in 1924. [7] Including boots and shoes.

are among those comparatively bulky commodities that help to cheapen the carriage of more valuable ones. (See the table on p. 340.) Of the other features of the export trade of the country the steady or almost steady increase even in the relative value of the

UNITED KINGDOM

EXPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Raw Materials	—	*13·6*	*13·4* [1]		
Coal and coke	9·8	6·4	8·7		
Foods	—	*5·9*	*5·4* [1]		
Fish	1·1	1·1	1·1		
Spirits	1·5	1·3	1·6		
Manufactures	—	*71·3*	*57·2* [1]		
Cotton manufrs.	24·9	19·2	15·3		
Yarn	3·5	3·0	2·7		
Thread	0·9	0·9	1·1		
Iron and steel	9·3	8·3	6·9		
Machinery	5·6	7·4	8·3		
Automobiles	—	2·4 [2]	3·3 [2]		
New ships	0·7	1·8	1·1		
Electrical goods	1·3	1·8	1·9		
Railway vehicles	—	1·4	0·6		
Wool manufrs.	8·5	7·2	6·9		
Tissues	5·2	4·6	3·8		
Yarn	2·0	1·5	1·6		
Tops	0·8	0·7	0·8		
Silk and art silk	0·3	1·4	1·3		
Linen yarn and manufrs.	1·7	1·4	1·5		
Apparel (including boots and hats)	3·8	3·7	3·0		
Paper and cardboard	—	1·4	1·6		
Rubber manufrs.	—	1·3	1·4		
Earthenware and glass	1·6	1·9	2·0		
Leather manufrs.	1·5	1·1	0·9		
Chemicals	3·2	3·5	4·7		
Total in £ millions	795·4	338·6	389·5		

[1] Classes are for 1931–4 only. [2] Includes cars and other road vehicles, and parts.

exports of coal and machinery before the War was very noteworthy. Since the War the quantity of coal exported has fluctuated widely, partly as a result of labour disputes, as in 1926, but mainly for the reasons given above.

As to destinations we may note that the maximum percentage to India was in 1886–90, since when it has been comparatively steady. There was a marked fall to the Germany,

UNITED KINGDOM

EXPORTS OF FOREIGN AND COLONIAL PRODUCE

Principal Articles.	Average Value in Millions Sterling.									Percentages.									Change % 1924 on 1911–13.	
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	1924	'71–75	'81–86	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	1924	Value	Quant.
1. Wool, exc. mohair, &c.	9·62	15·26	13·91	14·93	10·68	10·35	13·57	13·58	31·35	16·5	24·2	22·7	21·7	17·5	14·7	15·0	12·6	22·4	+131	+ 14
2. Rubber	0·59	1·25	1·42	1·81	3·51	4·65	8·42	14·86	10·12	1·0	1·9	2·3	3·0	5·7	6·6	9·3	13·8	7·2	− 32	+111
3. Raw cotton	8·13	5·27	5·17	4·23	4·21	6·42	8·40	10·15	11·59	13·9	8·3	8·3	7·0	6·9	9·1	9·3	9·4	8·3	+ 14	− 50
4. Hides and skins, raw, and furs[1]	*2·26*	2·56	2·97	3·44	4·30	*4·54*	*6·38*	*7·67*	*13·10*	*3·9*	4·1	4·8	5·7	7·1	*6·5*	*7·1*	7·1	9·4	+ 71	—
Raw Hides	*1·47*	*1·66*	*1·43*	*0·95*	*1·25*	*0·80*	*1·21*	*1·88*	*1·95*	*2·5*	*2·6*	*2·3*	*1·6*	*2·0*	*1·1*	*1·3*	*1·7*	*1·4*	+ 4	− 4
Raw sheep- and goat-skins	*0·17*	*0·46*	*0·66*	*1·31*	*1·66*	*2·04*	*2·59*	*2·48*	*2·15*	*0·3*	*0·7*	*1·1*	*2·2*	*2·7*	*2·9*	*2·9*	*2·3*	*1·5*	− 13	—
5. Tin	0·28	1·16	1·55	1·48	1·54	3·15	4·77	6·44	2·56	0·5	1·8	2·5	2·4	2·5	4·5	5·3	6·0	1·8	− 60	− 33
6. Cottons	—	—	—	0·46	0·63	1·01	2·59	2·27	2·58	—	—	—	0·8	1·0	1·4	2·9	2·1	1·8	+ 14	—
7. Jute	0·68	1·13	1·41	1·41	1·36	1·57	2·28	2·93	0·35	1·1	1·8	2·3	2·3	2·2	2·2	2·5	2·7	0·3	− 88	− 92
8. Tea	2·82	2·39	1·84	1·49	1·52	1·77	2·16	2·61	6·94	4·8	3·8	3·0	2·5	2·5	2·5	2·4	2·4	2·4	+166	+ 43
9. Tallow and stearine	0·17	0·41	0·40	0·77	1·04	1·15	1·74	1·77	1·61	0·3	0·7	0·6	1·3	1·7	1·6	1·9	1·6	1·2	− 9	− 72
10. Jute manufactures	—	—	—	—	1·35	1·84	1·69	1·46	1·09	—	—	—	—	2·2	2·6	1·9	1·4	0·8	− 25	—
11. Leather	0·56	1·10	1·53	1·68	1·81	1·36	1·66	1·95	1·82	1·0	1·7	2·5	2·8	3·0	1·9	1·8	1·8	1·3	− 7	− 47
12. Grain and flour	2·52	2·61	1·88	1·83	1·72	1·18	1·56	1·72	2·35	4·3	4·1	3·0	3·0	2·8	1·7	1·7	1·6	1·7	+ 37	+ 1
Rice	*1·95*	*1·72*	*1·29*	*1·22*	*0·99*	*0·30*	*0·85*	*0·76*	*0·46*	*3·4*	*2·7*	*2·1*	*2·0*	*1·6*	*1·1*	*0·9*	*0·7*	*0·3*	− 39	− 64
Wheat and flour	*0·45*	*0·51*	*0·32*	*0·30*	*0·32*	*0·15*	*0·24*	*0·30*	*0·77*	*0·8*	*0·8*	*0·5*	*0·5*	*0·5*	*0·2*	*0·2*	*0·3*	*0·6*	+156	+147
13. Coffee	5·20	3·43	2·78	2·31	1·98	1·77	1·54	1·86	1·66	8·9	5·4	4·5	3·8	3·2	2·5	1·7	1·7	1·2	− 11	− 48
14. Feathers, ornamental	0·14	0·79	0·44	0·45	0·59	0·77	1·47	1·97	0·27	0·2	1·3	0·7	0·7	1·0	1·1	1·6	1·8	0·2	− 86	− 61
15. Silks, excluding lace	0·41	0·45	0·76	0·72	0·83	1·10	1·46	1·63	3·45	0·7	0·7	1·2	1·2	1·4	1·5	1·6	1·5	2·5	+112	—
16. Copper	1·50	0·70	1·07	0·50	0·99	0·95	1·45	1·22	0·34	2·6	1·1	1·7	0·8	1·6	1·4	1·6	1·1	0·2	− 72	—
17. Hemp, dressed and raw	0·24	0·44	0·95	0·96	0·95	1·70	1·25	1·33	0·98	0·4	0·7	1·5	1·6	1·5	2·4	1·4	1·2	0·7	− 26	− 33
18. Gums	0·61	0·67	0·62	0·73	0·74	1·05	1·13	1·01	0·85	1·0	1·1	1·0	1·2	1·2	1·5	1·2	0·9	0·6	− 16	− 26
Wine	0·87	0·57	0·59	0·54	0·49	0·19	0·45	0·51	0·63	1·5	0·9	1·0	0·9	0·8	0·7	0·5	0·5	0·5	+ 24	− 9
Indigo	1·84	1·65	1·12	0·82	0·66	0·21	0·07	0·04	0·01	3·1	2·6	1·8	1·4	1·1	0·3	0·1	0·0	—	—	—
Raw silk	3·28	0·47	0·20	0·06	0·07	0·12	0·04	0·10	0·10	5·6	0·7	0·3	0·1	0·1	0·2	0·0	0·1	0·1	—	—
Average total value and percentage of gross exports	58·18	63·04	62·20	60·53	61·01	70·26	90·35	108·00	140·00	19·5	21·3	20·8	21·1	19·7	19·4	18·9	18·3	15·3		
Average gross exports, ex. ships	297·70	295·30	298·50	287·50	310·10	361·40	479·00	589·00	929·80											

[1] For 1871–75 excluding sheep-skins; furs include dressed and undressed to 1902 inclusive, thereafter undressed only, average value dressed furs 1903–05 £0·65; 1906–10 £0·48 million.

Belgium, Netherlands group between 1871–75 and 1881–85, but since then the percentage has been fluctuating. The highest percentage to the United States was in 1871–75, since when, with the establishment of home manufactures in that country there has been

UNITED KINGDOM

EXPORTS OF IMPORTED PRODUCE

—	Percentages of Total Value.				
	1924.	1926–30.	1931–5.	—	—
Raw Materials :					
Wool	22·4	22·3	22·3		
Rubber	7·2	13·2	3·7		
Raw hides	1·4	1·2	0·7		
Raw skins and furs	8·0	8·6	12·4		
Cotton	8·3	4·9	3·3		
Jute	0·3	0·3	0·4		
Petroleum	—	1·3	1·9		
Tin	1·8	1·7	1·2		
Foodstuffs :					
Tea	5·0	6·8	8·7		
Meat	—	3·1	2·3		
Fish	—	1·4	1·2		
Spices	—	0·9	0·4		
Tobacco	—	0·7	1·3		
Coffee	1·2	1·8	2·7		
Butter	—	1·2	1·9		
Fruit	—	1·2	2·1		
Maize	0·7	0·6	0·9		
Wine	0·5	0·5	0·7		
Manufactures :					
Leather	1·3	1·7	2·0		
Silk goods	2·5	1·4	0·8		
Carpets and rugs	—	1·3	1·0		
Cotton manufrs.	1·8	0·7	0·3		
Machinery	—	1·4	1·2		
Art silk	—	0·6	0·9		
Drugs and medicine	—	0·4	0·7		
Total in £ millions	140	113	54		

a steady decline. This is an outstanding example of the trend of trade to be expected with all ‘ new ’ countries as they develop.

The last two tables of the trade statistics of the United Kingdom relate to a highly characteristic trade, one in articles that have been collected from many different parts of the globe, to be as widely distributed again in other parts. The wool of Australia and South Africa is sent by us to Germany, France, and the United States; raw cotton from America, Egypt, and India is redistributed on the

UNITED KINGDOM

COUNTRIES OF ORIGIN OF IMPORTS: PERCENTAGES OF TOTAL VALUE

From	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'11–13[1]	1925–9
All Brit. Possessions	*22·2*	*23·5*	*22·9*	*22·9*	*21·2*	*21·2*	*23·7*	*25·0*	*25·0*	*29·1*
1. United States	18·4	23·2	22·4	23·0	25·5	23·1	19·9	18·5	18·2	17·1
2. France	11·6	9·6	10·4	10·7	11·0	9·4	8·2	7·2	6·1	4·9
3. Germany	5·6	6·2	6·5	6·4	6·0	6·3	6·2	6·2	9·8	5·1
4. India	8·6	8·9	8·3	6·8	5·6	5·9	6·0	6·7	6·7	5·3
5. Netherlands	3·9	6·2	6·6	6·8	6·2	6·4	6·0	6·5	2·9	3·7
6. Russia	6·2	4·5	5·5	5·1	4·4	5·3	5·4	5·5	5·7	1·9
7. Australia	4·8	6·5	6·5	5·6	4·6	4·1	5·2	5·2	5·2	4·8
13. New Zealand				1·9	2·0	2·2	2·8	2·7	2·7	3·9
8. Argentine Republic	0·5	0·3	0·7	1·3	2·0	3·5	4·7	5·0	5·0	6·0
9. Belgium	3·9	3·6	4·1	4·1	4·5	5·0	4·6	5·2	3·1	3·5
10. British N. America	2·9	2·8	2·8	3·2	4·2	4·5	4·5	3·9	3·9	4·7
11. Egypt	3·8	2·3	2·0	2·3	2·2	2·5	3·1	3·1	3·1	2·2
12. Denmark	1·0	1·3	1·7	2·1	2·5	2·9	3·0	3·1	3·1	4·1
14. Sweden and Norway	2·6	2·8	2·9	2·9	3·2	2·9	2·7	2·7	2·7	2·9
15. Spain	2·5	2·6	2·8	2·6	2·9	2·6	2·3	1·9	1·9	1·5
16. Brazil	2·1	1·4	1·2	1·0	0·9	1·2	1·7	1·4	1·4	0·4
17. Straits Settlements	0·9	1·1	1·3	1·1	1·0	1·2	1·4	2·0	2·4	1·3
18. Cape and Natal	1·1	1·4	1·4	1·3	1·1	1·0	1·3	1·5	1·5	1·8
19. Chile	1·3	0·7	0·7	0·9	0·8	0·9	1·0	0·9	0·7	0·8
20. Ceylon	1·0	0·6	0·7	1·0	1·0	0·8	0·8	1·0	1·0	1·3
21. China & Hong Kong	3·6	2·8	2·0	1·1	0·8	0·6	0·7	0·7	0·8	—
China	*3·5*	*2·5*	*1·6*	*0·9*	*0·6*	*0·5*	*0·6*	*0·6*	*0·7*	*1·0*
Hong Kong	*0·2*	*0·3*	*0·3*	*0·2*	*0·2*	*0·1*	*0·1*	*0·1*	*0·1*	—
22. Roumania	0·2	0·9	0·9	0·9	0·5	0·7	0·6	0·5	0·5	—
23. Italy	1·2	0·8	0·8	0·8	0·7	0·6	0·6	0·6	1·1	1·4
24. Japan	0·1	0·2	0·2	0·2	0·3	0·4	0·6	0·5	0·5	0·7
25. Portugal	1·2	0·8	0·7	0·7	0·6	0·6	0·5	0·4	0·4	0·3
26. Peru	1·3	0·6	0·4	0·3	0·3	0·4	0·4	0·4	0·4	—
27. West Indies and Guiana	1·9	1·3	0·8	0·6	0·4	0·4	0·4	0·3	0·4	—

COUNTRIES OF DESTINATION OF EXPORTS OF BRITISH PRODUCE (PERCENTAGES)

To	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	1925–9
All British Possessions	*26·8*	*35·0*	*34·4*	*33·1*	*34·5*	*37·8*	*33·7*	*36·4*	*45·5*
1. British India	8·9	12·9	13·5	12·5	11·9	12·8	12·2	12·5	11·6
2. Germany	11·2	7·7	7·2	8·1	9·7	8·0	9·1	8·3	5·3
3. United States of America	13·2	11·6	12·5	11·0	7·5	7·5	7·3	6·0	6·7
4. Australia	6·7	10·3	8·3	6·8	7·4	6·3	6·1	6·9	8·2
18. New Zealand			1·3	1·4	1·8	2·1	2·1	2·2	2·9
5. France	7·1	7·2	6·2	6·3	6·3	5·4	5·7	5·5	3·7
6. Argentine Republic	1·3	2·0	3·2	2·2	2·4	3·1	4·6	4·3	3·9
7. British North America	3·8	3·7	3·3	3·0	2·7	3·8	4·2	4·8	4·0[2]
8. Cape and Natal	1·6	2·3	2·7	3·8	5·1	6·9	3·7	4·2	4·4[3]
9. China and Hong Kong	3·7	3·5	3·5	3·2	3·3	4·0	3·5	3·4	—
China	—	—	*2·5*	*2·3*	*2·4*	*2·9*	*2·6*	*2·6*	*2·0*
Hong Kong	—	—	*1·0*	*0·9*	*0·9*	*1·1*	*0·8*	*0·7*	—
10. Italy	2·8	2·9	2·9	2·5	2·6	2·8	3·3	2·9	2·0
11. Belgium	2·6	3·4	3·0	3·2	3·6	3·1	3·3	3·3	2·4
12. Netherlands	6·2	4·0	3·8	3·9	3·7	3·0	3·2	3·0	3·0
13. Russia	3·3	2·3	2·1	2·7	3·7	2·9	2·9	3·1	0·6
14. Japan	0·7	1·0	1·5	1·6	2·7	2·2	2·7	2·7	2·0
15. Sweden and Norway	1·7	1·6	1·7	2·1	2·7	2·6	2·6	2·7	2·4
16. Brazil	3·0	2·8	2·7	3·4	2·3	1·9	2·6	2·6	2·0
17. Egypt	2·3	1·3	1·3	1·6	1·9	2·4	2·3	2·0	2·1
19. Turkey	2·9	2·8	2·5	2·7	2·2	2·2	2·0	1·8	0·5
20. Chile	1·1	0·9	1·0	1·2	1·0	1·2	1·4	1·3	0·9
21. Denmark	0·9	0·9	0·9	1·2	1·4	1·3	1·3	1·2	1·4
22. Spain	1·5	1·6	1·6	1·8	1·6	1·6	1·3	—	1·4
23. Java, &c.	0·5	0·9	0·6	1·0	0·9	1·0	1·0	—	1·4[4]
24. Austria-Hungary	0·5	0·4	0·4	0·6	0·7	0·7	1·0	—	—
25. Straits Settlements	0·9	1·1	1·1	0·9	1·0	1·1	1·0	—	1·6
26. Brit. W. Indies and Guiana	1·3	1·3	1·2	1·3	1·0	0·9	0·8	—	—
27. Portuguese East Africa	—	—	—	0·1	0·4	0·6	0·8	—	—
29. Nigeria	—	—	—	0·4	0·4	0·5	0·6	—	1·4

[1] The last two columns give countries of consignment, 'imports' on British tables being credited to the countries from whose ports goods were directly shipped to this country. Information as to the countries from which goods were consigned or dispatched to the United Kingdom was first given in the *Statistical Abstract for the United Kingdom for 1909*, but referring to the years from 1904 onwards. 'Imports' are retained in this table, however, for the sake of comparability. From the two 1911–13 columns it will be seen that the countries showing the greatest difference between imports and consignments are Germany, the Netherlands, Belgium, and France.

[2] Canada. [3] Union of South Africa. [4] Dutch East Indies.

continent of Europe; silks are imported from France and sent to Australia along with the numerous products of British industry

UNITED KINGDOM

IMPORTS

Countries of Origin.	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
United States	18·5	16·3	11·6		
Argentina	6·2	6·1	6·4		
Germany	2·9	5·6	4·9		
India	6·2	5·1	5·0		
France	5·3	4·9	3·3		
Denmark	3·8	4·6	5·2		
Australia	4·6	4·4	6·6		
Canada	5·2	4·4	6·2		
Irish Free State	4·0	3·8	3·2		
Netherlands	3·3	3·8	3·3		
New Zealand	3·8	3·9	5·1		
Belgium	2·8	3·0	2·5		
U.S.S.R.	1·5	2·2	2·8		
Sweden	1·6	2·0	2·3		
Egypt	3·0	1·9	1·6		
Empire	*30·2*	*27·1*	*33·5*		
Foreign Countries	*69·8*	*72·9*	*66·5*		

EXPORTS

Countries of Destination.	1921.	1926–30.	1931–35.	—	—
British India	11·3	11·2	8·8		
Australia	7·8	7·2	5·6		
United States	6·6	6·3	5·0		
Irish Free State	5·3	5·5	6·2		
Germany	5·4	5·1	4·3		
Canada	3·5	4·6	4·8		
Union of South Africa	3·8	4·2	6·2		
Argentina	3·4	4·0	3·4		
France	5·2	3·9	5·0		
Netherlands	3·1	3·1	3·2		
Belgium	2·8	2·9	2·5		
New Zealand	2·6	2·7	2·8		
Italy	2·2	2·0	2·3		
Empire	*41·7*	*45·6*	*45·7*		
Foreign Countries	*58·3*	*54·4*	*54·3*		

destined for the same market, and so on. A great variety of articles of Eastern origin, including much Egyptian cotton, is exported by us to the United States. The commodities that make up this

entrepôt trade, as it is called, are mainly such as are bought by British merchants to be resold to customers whether at home or abroad, so that they enter into the *entrepôt* trade only when bought on foreign or colonial account, but nearly a quarter of this trade is in goods originally bought for countries abroad, but sent to this country on through bills of lading. On the other hand, it does not include the value of the goods transhipped at British ports in bond, and these goods are partly made up of goods bought by British merchants for resale to any customer, partly of goods sent on through bills of lading.

That the central position of this country contributes to this trade would seem to be indicated by the fact that the table now referred to shows that from the period 1886–90 to 1913 about three-fifths of the value of that trade has been carried on with the United States on the one hand and Germany, France, and Belgium on the other.

Still the great development of the *entrepôt* and transhipment trade is not to be ascribed solely to the geographical position of this country. Two other important factors may be pointed out as contributing to this result. One is the peculiarly one-sided character of British industries. The fact that so large a proportion of the exports of the country consist of manufactured goods of various kinds necessarily makes it dependent on other countries to an unparalleled extent for imports of food-stuffs and raw materials. The large trade with all parts of the world based on the country's own products and requirements necessitates the employment of the vast amount of shipping, which furnishes at the same time conveniences for an *entrepôt* and transhipment trade. The other important factor referred to as likely to stimulate the trade of this class is the enormous trade in coal and other bulky articles, the indirect results of which are likely to be favourable to this trade in much the same way as it promotes our import trade generally. In view of this consideration it is only what might be expected to find that the chief articles under this head are of comparatively high value in proportion to their bulk. Of the first eight mentioned in the table, jute was the only one valued before the War at less than £60 a ton. A further circumstance favouring this trade is the number and situation of our seaports. Part of the *entrepôt* trade of the country, for example, consists in the exporting at Dover of wool imported at London, the exporting at Hull of raw cotton imported at Liverpool. As regards the destinations of such exports, the rise before the War was most considerable in the United States. The increase in this trade to Russia was fairly large and to the Argentine noticeable.

We cannot put out of sight the fact that, however great the advantages of the United Kingdom may be for the carrying on of manufacturing industries and foreign commerce, these advantages

were necessarily relatively much greater at a period when the British Isles had coal-fields more or less developed and other countries had not, when these islands had already effected the change from domestic and hand-labour in spinning and weaving and other countries had not, than at a time when these changes have been brought about in other countries or are in rapid progress. Hence it was inevitable that foreign countries, and especially those provided by nature with coal-fields or abundant water-power, should gain upon the United Kingdom in the great branches of industry to which modern machinery is chiefly applied, and gain all the more rapidly because they begin with the latest machinery and the most advanced organisation, while the older seats of industry are inevitably burdened more or less with what is out of date. And though to us the growth of such rivalry may be the cause of temporary hardship, the result must be regarded as on the whole satisfactory, as tending in the direction of that equal distribution of industry and comparative stability which, we hope, it is the mission of commerce to realise.

Seaports. On the average of the period 1908–12 the ten following seaports—London, Liverpool, Hull, Manchester, Harwich, Southampton, Bristol, Glasgow, Leith, and Grimsby—received nearly 83 per cent. of the total value of the imports of the United Kingdom, and despatched nearly 85 per cent. by value of all the exports. In recent years the order has been London, Liverpool, Hull, Southampton, Manchester, Glasgow, Harwich, Bristol, and Grimsby. The first two of the seaports just named handle 60 per cent. of the total trade; Liverpool leads in exports, London in imports.

First in rank among the British seaports still stands London, as it always has done, having received during the years 1909–13, 33 per cent. of the imports in value and despatched 25 per cent. of the exports—proportions which have steadily increased since the War. The situation at the head of ocean navigation on a river which allows ocean vessels to ascend far into the interior of the Kingdom, and which has its mouth directly opposite another great estuary—that of the Scheldt—and nearly opposite the mouth of the Rhine, gives it a commanding position for continental trade. It is these two circumstances which determined its early growth, and hence indirectly made it the capital of the country, a position which favoured its further increase in population and wealth more and more as the British Empire extended. It thus became ultimately the greatest import market in the world, a fact which of necessity greatly promoted its *entrepôt* and transhipment trade, especially since so much of that trade, on the export side, is carried on with the neighbouring continental countries. More than 50 per cent. of that characteristic trade of the United Kingdom is carried on at this port. The enormous local market—Greater London has a

population of over 9,000,000—together with the facilities for redistribution by both land and sea, are no doubt the circumstances that have made London the one great port, not only for such Eastern products as tea and spices, but also for coffee and cocoa, and it is no doubt the latter circumstance—the ease of redistribution, as well as collection—that has been the determining factor in making London the chief centre for Australian trade. Increasing difficulty was felt in meeting the requirements of the enormous shipping of this port, and the complaints of shippers led in 1908 to the passing of an Act placing the whole port, defined as extending from the tidal limit of the river at Teddington Lock to a line joining Havengore Creek in Essex to Warden Point in the Isle of Sheppey, under the control of a single authority known as the Port of London Authority, which has acquired not only all the docks of importance, but also the warehouses belonging to them. This authority provides for the establishment and maintenance of a 14-feet channel at low water up to London Bridge, and one of 30 feet in depth with a minimum width of 600 feet up to the Albert Docks opposite Woolwich. The Tilbury Docks, opened in 1886, were the deepest docks of the port, 38 feet; and they had 54½ acres of water-space; the docks were extended, a new lock opened at Tilbury in 1929 with a length of 1,000 feet and width of 110 feet.

Liverpool has risen to a high rank among the seaports of the world only within the last two hundred years. Early in the eighteenth century it was a small place; its chief trade was with Ireland, and in that trade it had rivals in Preston and Chester, which were equally well suited for the small ships then in use. Its importance rose with the growth of the American trade and with the development of the cotton, woollen, and other manufactures of its hinterland, which may be said to include the whole of the industrial area from the Ribble to the north of Warwickshire and even, for the bulk of oceanic traffic, that lying to the east of the Pennine Chain in the West Riding of Yorkshire. The inadequacy of the ports at the mouths of the Ribble, Dee, and even the Severn, prevents them from offering in the meantime any serious rivalry. Since 1894, however, as noted above, its hinterland has been encroached on by the port of Manchester. Though the Mersey, as a mere harbour, is capacious enough to admit all the fleets of the world, the building of docks and quays has been necessary for commerce, and the six or seven miles of continuous docks on the Liverpool side of the Mersey present a sight unparalleled elsewhere. The port of Liverpool includes the docks on the Cheshire side of the Mersey at Birkenhead, as well as the Garston docks on the Lancashire side, belonging to the London, Midland and Scottish Railway Company, whose train marshalling sidings are a special feature. Except these last docks, the port is under the control of the Mersey Docks and Harbour Board, con-

stituted in 1857. A sandbank at the mouth of the Mersey, which formerly prevented the entrance of large vessels at low tide, has been dredged so as to allow of large modern liners entering or leaving the port at dead low water. Birkenhead-Wallasey, since the completion of the rail and road tunnels under the Mersey, may be fairly regarded as forming geographically part of Liverpool.

Hull, lying as it does on the east or continental side of the island, is one of the older ports of England, though its antiquity does not reach back to Roman times. It is said to have been founded by King Edward I., who here encouraged the building of a town, which was called King's Town. Hence the full name of the town, Kingston-upon-Hull, Hull being properly the name of a small river which enters the Humber at the place where the town stands. Its ancient and large trade in fish is still maintained, being favoured by the convenience of its situation for the supply of the northern midlands, though to a less extent London and the southern midlands, for which, especially London, Grimsby on the Lincolnshire coast has greater advantages. Recently its wool imports for the supply of the same region have been rapidly increasing. Thus the import of raw wool at Hull in 1913 was 48 million lbs. (less than 10 per cent. of that of London), in 1920, 70 million lbs. (nearly 14 per cent. of London), in 1929, 148 million lbs. (over 38 per cent. of London), but the proportion has since fallen. The leading import of Hull is, in normal years, wheat; but the port resembles London in the very general nature of the cargoes handled. Many of the imports are off-loaded into lighters for water carriage into the hinterland. It has also a large trade in oil-seeds, a trade favoured by the large adjacent markets for oil-cake on the one hand, and for the oils and oil products in the manufacturing districts. The port of Grimsby, whose docks and quays belong to the London and North Eastern Railway, includes Immingham, a short distance to the north, which has been specially equipped for the export of coal and large iron and steel castings. Goole, the third of the Humber ports, owes its importance chiefly to the shipment of coal brought by the Aire and Calder navigation and development by the London, Midland and Scottish Railway.

Glasgow, now surpassed by Southampton in respect of the total value of its imports and exports, has had a history in many respects similar to that of Liverpool. It has risen into importance only with the development of the New World and modern manufacturing industry, and the accommodation that it affords for mercantile shipping has had to be provided artificially to even a greater extent than in the Mersey. Its first lucrative trans-oceanic trade was with the southern 'Plantations' of North America and the West Indies, whence tobacco and sugar, then relatively more valuable than they are now, were imported. The trade began as a smuggling trade

even before the union of the English and Scottish parliaments, but so flourished afterwards that Glasgow beat all its English rivals in the tobacco trade, for the tobacco, brought from the Plantations under the regulations then in force first in this country, but being mostly exported to the continent, had a shorter land transport, even from Irvine, which was then the port of Glasgow, to an eastern port (Bo'ness), than could be found at any other port in Great Britain. The Clyde, however, was then but a small river. Little more than a hundred years ago it was still fordable twelve miles below Glasgow. Then came the modern inventions which made coal and iron so all-important, and the fact that these minerals are found together in the immediate vicinity of Glasgow made it worth while to convert the river into a channel of the sea, bearing on its waters the ships of all nations, and of the deepest draught. Glasgow, at the same time, is a great manufacturing town, but the industries carried on there are so varied that none can be singled out as specially characteristic, except the shipbuilding of the Clyde and marine engineering. As the western outlet of one of the chief manufacturing districts of Great Britain its export trade is very large, and Glasgow is indeed singular among the great ports of the country in having an export trade 50 per cent. more in value than its import trade. The reason is that many of the most valuable of the imports of the Glasgow district come from the continent and enter the country by the eastern ports of Leith and Grangemouth, which latter has supplanted Bo'ness since its foundation on the mud-bank chosen for the eastern terminus of the Forth and Clyde Canal. Greenock, the only other port of any consequence on the Clyde, has a comparatively small import and export trade.

Southampton, the chief commercial port on the south coast, is one whose commerce and shipping, like those of the other southern ports, reach back to an early date. A Roman station existed on the small tongue of land between the Itchen and the Test, on which the town is situated. In 1891 its docks, which now afford accommodation alongside of the quay walls for the largest ships yet built, were acquired by the London and South Western Railway Company, now part of the Southern Railway, and since then its shipping has increased at a more rapid rate than that of any other leading British port. Its position, together with its ample accommodation and easy entrance, makes it a convenient calling-place for trans-Atlantic liners. It is the only port, besides London, on the south or south-east of England that has an export trade exceeding 2 per cent. of the total value of the export trade of the United Kingdom, its trade under this head being fairly representative of British export trade generally. An important feature of its import trade is the reception of large quantities of fresh and refrigerated meat and fruit. It has also a large passenger traffic, especially with the West Indies, North

STATEMENT SHOWING FOR THE UNITED KINGDOM, BY THE METHOD OF INDEX NUMBERS, THE FLUCTUATION IN THE WHOLESALE PRICES OF CERTAIN PRINCIPAL ARTICLES AND A COMBINED INDEX NUMBER FOR FORTY-FIVE PRINCIPAL ARTICLES IN CERTAIN OF THE YEARS 1871–1908, AND FOR EACH OF THE YEARS 1908–36.

The figures for the years 1871–1908 are taken from *Statistical Tables and Charts relating to British and Foreign Trade and Industry*, 1909, prices in the year 1900 being taken as 100. The second half of the table showing Index numbers for 1873, 1896, and 1908 to 1936 are the *Statist's* index numbers, in which the standard period is the eleven years 1867–77. The figures are brought up to date annually in the *Journal of the Royal Statistical Society* and in the *Statist*.

Years	Coal	Raw Cotton		Raw Flax	British Wheat	Foreign Wheat	British Oats	Foreign Oats	Maize	Rice	Potatoes	Beef		Bacon	Tea	Petroleum[3]	Hewn Fir	Hides	Caoutchouc	General Index Number for Forty-five Articles
1871	58·3	135·1		121·2	210·5	174·1	113·1	116·6	169·0	133·2	163·9	112·2		117·9	192·5	213·8	159·1	121·1	76·9	136·0
1873	124·0	153·7		128·9	218·0	191·3	111·5	151·7	155·2	129·7	193·8	126·7		97·9	195·2	273·2	176·6	142·9	81·5	152·7
1880	53·0	112·7		119·1	161·7	162·9	131·3	137·0	131·9	124·1	191·8	122·4		95·9	157·7	154·9	134·4	126·3	103·5	129·6
1890	75·0	102·3		86·7	118·6	114·7	105·7	117·9	99·8	111·9	125·4	100·0		88·2	121·7	104·8	165·6	98·0	90·9	101·0
1896	52·8	88·7		91·3	97·2	91·0	83·9	92·3	80·0	97·4	101·1	91·4		82·7	111·8	99·2	92·2	92·3	85·1	88·2
1900	100·0	100·0		100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0		100·0	100·0	100·0	100·0	100·0	100·0	100·0
1908	76·5	116·1		99·6	118·9	123·5	101·4	119·9	135·0	99·1	113·4	98·3		122·0	93·2	88·9	87·7	119·0	107·0	102·8
1867–77	100[1]	100	100[2]	100	100	100	100		100	100	100	100	100[4]	100	100	100	100[5]	100		100·0
1873	167	100	92	97	108	113	98		92	95	137	110	112	109	102	122	111	—		111·4
1896	71	48	46	56	48	52	57		46	62	47	76	68	68	44	41	71	—		69·9
1908	102	64	64	56	59	67	69		83	76	69	83	90	81	46	54	78	90		73·2
1909	90	70	72	64	68	71	73		85	71	56	88	99	90	46	51	77	100		74·4
1910	94	89	89	77	58	65	67		73	72	63	92	96	101	44	48	83	106		77·9
1911	91	78	89	86	58	63	72		78	82	71	87	90	89	50	43	84	106		79·7
1912	102	72	79	82	64	68	83		85	101	74	95	98	93	50	66	89	114		85·1
1913	112	78	84	80	58	65	73		73	82	67	92	98	101	48	68	90	133		85·0
1914	109	71	67	76	64	72	81		90	91	61	96	105	102	53	61	93	139		85·1
1915	136	65	64	134	99	107	118		128	132	80	122	136	125	69	71	131	119		107·6
1916	197	100	104	172	107	121	128		163	168	131	138	154	118	68	98	202	174		135·9
1917	217	183	201	282	139	119	199		221	252	160	177	292	200	117	129	270	225		171·8
1918	245	218	253	294	134	140	190		241	262	122	171	207	247	137	170	332	213		192·2
1919	370	218	219	313	134	131	201		242	258	170	183	216	258	105	138	325	258		206·2
1920	638	257	203	495	148	165	221		279	418	207	212	250	324	91	203	335	257		251·1
1921	279	104	86	246	133	132	132		118	184	169	195	220	242	55	177	198	123		155·4
1922	193	134	118	191	88	95	112		96	148	111	150	164	196	82	122	143	114		131·0
1923	201	169	148	179	77	84	103		111	148	86	131	149	154	100	104	157	113		129·0
1924	187	181	163	239	90	96	105		122	167	159	139	152	143	96	105	151	119		139·3
1925	161	140	163	227	96	111	105		119	160	132	136	147	171	88	105	150	132		136
1926	149	104	115	147	98	105	96		92	163	109	125	134	176	89	104	137	121		126
1927	142	106	123	181	90	104	97		95	159	116	119	124	138	81	104	131	112		122
1928	125	121	128	203	82	91	112		118	150	114	125	133	137	77	91	138	172		120
1929	129	114	114	157	77	91	95		112	143	95	120	132	157	71	103	131	129		115
1930	133	82	76	121	63	66	66		71	130	79	124	136	143	67	102	129	92		97
1931	127	66	68	76	41	45	68		48	93	125	114	122	113	60	90	106	77		83
1932	130	58	72	93	46	49	74		58	93	130	110	118	101	50	81	97	66		80
1933	129	62	67	106	42	46	61		53	78	71	103	104	110	63	82	94	68		79
1934	129	74	71	119	37	50	67		60	77	83	98	104	122	77	80	97	67		82
1935	130	74	80	161	41	56	72		53	88	91	92	98	120	68	84	93	69		84

[1] Coal: average export price. [2] Raw cotton: first column, Middling American; second column, Fair Dhollerah. [3] Petroleum as compared with the average from 1873–77 only.
[4] Beef: first column, prime; second column, middling. [5] Figures in this column below the thick line refer to 'timber.'

and South America, and Africa. With Southampton may be contrasted Dover, Folkestone, and Newhaven, all packet-stations in connection with the Southern Railway, and Harwich (L.N.E.R.), all having an import trade similar in character, but a relatively small export trade. The imports are largely made up of perishable articles, such as butter, eggs, fresh meat, poultry, fish, fruit, and of manufactured articles of relatively high value in proportion to their bulk, such as silks, woollens, gloves, watches, and parts of watches. Folkestone and Dover together admit all but a small fraction of the wearing apparel of Parisian origin imported into this country. Bristol is the only western seaport noted in the early commerce of England. Owing to the shallowness of the upper part of the estuary of the Severn, it served as an outlet not only for the populous region immediately to the east of it, but also for the Severn valley, and after the settlement of the New World it was one of the first seaports to secure a large share of the trade in tobacco and sugar. At the present day its import trade continues large, but its exports are comparatively insignificant. Its development has been retarded by the inadequacy of the Avon to meet the requirements of large modern ships. The corporation of the city of Bristol has, however, constructed large deep-water docks near the mouth of the Avon, at Avonmouth, included in the port of Bristol. Considering the position of the port one might expect that, with sufficient shipping accommodation, it ought not merely to carry on a large passenger traffic, but to serve, in a great measure, as the port for the southern midlands. With the improvements mentioned there has been a considerable increase in trade.

Edinburgh has the advantage of having two seaports within its extended boundaries of 1920—Leith and Granton. Leith has an import trade in many respects similar to that of Hull, but serves (along with Grangemouth) in an even higher ratio than Hull as an inlet for sugar, butter, cheese, eggs, and other continental produce destined for the populous districts in the west. The exports are comparatively small—larger, however, than at Bristol, seeing that some of the products of the west come here for export to the continent. Granton is a less busy port with smaller port dues, presenting accordingly advantages for ships laden wholly with one bulky commodity, but ill suited for large vessels with mixed cargoes, inasmuch as it has not the same facilities as Leith for distribution.

AVERAGE PRICES IN POUNDS STERLING PER TON

The following table is designed to show the value of a variety of commodities for the same unit of quantity in order that one may have an idea of the proportion of the addition to the total cost made by

transport costs, in so far as these depend on quantity. Except where there is an asterisk, the prices are import prices. As the figures are intended only for rough comparisons the prices are not entered with the same precision where the prices are high as where they are low. In 1936 prices rose so rapidly towards the end of the year that the average figure is only approximate.

	1912	1919	1921	1936
Apparel and drapery various	557·0	—	—	—
Bananas[1]	3·7	9·6	—	—
Bricks	0·8[2]	4·9[3]	—	—
Butter	121·6	251·0	187·8	120·0
Cacao, raw	58·0	81·2	—	30·0
„ prepared	152·0	228·0	—	—
Cement	1·6	5·3[3]	—	1·9
Cheese	64·2	113·2	93·9	66·0
Chemicals—				
Aniline and naphthalene dyestuffs	109·0[4]	608·0[3]	—	—
Caustic soda	9·7	21·3[3]	—	—
Coal	0·63	2·4[3]	—	1·0
Coffee	75·0	112·0	117·0	—
Copra	29·0	52·8	—	—
Cotton—				
Raw	92·3	218·0	169·2	60·0
Yarn	111·0	325·0	—	112·0
Sewing thread	358·0	1066·0[3]	—	—
Tissues, bleached	213·0	—	—	—
Hosiery	415·0	—	—	
Cutch and gambier	28·1	55·4	—	—
Feathers, ornamental	3615·0	3267·0	—	—
Fish—herrings	9·6	26·9	—	—
Flax	49·9	263·0	—	69·0
Fruit, apples	12·9	42·1	—	—
„ currants	25·8	71·3	48·2	—
Glass, window	11·5	63·6[5]	—	—
Grain—				
Wheat	8·5	19·2	11·8	7·5
Rice	11·3	29·5	17·0	9·0
Wheat meal and flour	10·8	29·0	15·4	13·2
Hemp	25·5	72·5	—	25·0
Hides, dry	71·1	169·0	—	58·0
Ice	0·5[4]	2·8	—	—
Iron, pig and puddled	4·5	12·6	—	4·2
Rails	6·61	32·4	—	8·5
Ship plates	7·5	—	—	10·0
Tinned, plates	14·2	38·3	—	—
Iron ore, non-manganiferous	0·8	2·2	—	—
Jute—raw	21·7	56·6	—	17·0
Yarn	38·3	185·0	—	—
Lard	51·0	171·0	—	62·0
Leather—				
Undressed	113·3	—	—	—
Dressed (excl. varnished or enamelled)	352·0	—	—	—
Linseed	12·2	37·4	—	28·0

	1912	1919	1921	1936
Linen yarn	91·2	468·0	—	—
Machinery[6]	35·0	—		—
„ textile	44·0[7]	—		—
Manures—				
Guano	5·8	12·1	—	—
Basic slag	1·5	6·3[3]		—
Nitrate of soda	10·3	21·0	—	—
Sulphate of ammonia	11·0	24·0[3]	—	—
Margarine	52·0	97·1	—	—
Meat—bacon	62·8	177·7	91·9	95·0
Mutton, frozen	49·5[4]	85·0	75·9	48·0
Metals—				
Copper regulus	38·9	72·1	—	45·0
Lead, pig and sheet	17·1	32·3	—	25·0
Tin	208·0	200·0	—	200·0
Oil—				
Coconut, refined	41·1	107·3	—	—
Olive, refined	60·3[7]	182·3	—	—
Palm, refined	41·1	72·0	—	—
Paper materials—				
Linen and cotton rags	10·7	28·9	—	—
Wood pulp	4·8	16·1	19·2	—
Pepper	60·8	121·4	—	—
Petroleum[8]—				
Lubricating	8·8	29·0	—	9·0[10]
Illuminating	3·6	9·9	—	—
Potatoes	6·0	31·3	—	7·0
Rosin	15·2	42·9	—	—
Rubber	392·0	231·0	—	84·0
Salt	0·83	3·5[3]	—	—
Slates, roofing	3·5	8·7	—	—
Sugar, refined	16·5	41·6	25·9	22·0
Tea	81·4	150·0	177·4	115·0
Tobacco—				
Unmanufactured	83·7	245·0	246·3	—
Cigars	1529·0	—	—	—
Cigarettes	866·0	—	—	—
Turpentine	31·3	85·1	—	—
Valonia	10·6	25·3	—	—
Wood[9]—				
Pit props	1·5	4·2	—	—
Oak, hewn	5·4	19·2[3]	—	—
Teak, „	13·5	42·8	—	—
Wool—				
Sheep or lamb's	92·3	208·0	205·7	112·0
Tops	174·0	485·0[3]	—	—
Woollen and worsted yarn	232·0	818·0[3]	—	—
Woollen cloths and stuffs	418·0[3]	—	—	—

[1] At 12 bunches to the ton.
[2] For 1912 at 250 bricks to the ton; for 1920 entered by quantity in the original returns, but inclusive of tiles and bricks. [3] 1920. [4] 1913.
[5] Window and German sheet glass, including shades and cylinders.
[6] The value here given for machinery is the approximate average value at the factory of all machinery, not electrical, returned at the United Kingdom Census of Production, 1907, both by quantity and value. See *Report*, Pt. II, p. 12. The corresponding value of textile machinery is approximately £33 per ton, that of exported textile machinery about £44. *Ibid.* p. 13.
[7] Per tun, which, in the case of olive oil, seems to be officially taken as equivalent to a ton.
[8] Lubricating petroleum at 245 gallons, illuminating at 278 gallons to the ton.
[9] For all classes of wood the ton taken at 40 cubic feet, a load being taken at 50 cubic feet.
[10] Petrol.

Cities and Towns of Great Britain and Northern Ireland, 1931

England

London (County)	4,397,000
Greater London	8,204,000
Birkenhead	148,000
Birmingham (City)	1,003,000
Blackburn	123,000
Blackpool	102,000
Bolton	178,000
Bournemouth	117,000
Bradford (City)	298,000
Brighton	147,000
Bristol (City)	397,000
Coventry (City)	167,000
Croydon	233,000
Derby	142,000
Gateshead	122,000
Huddersfield	113,000
Hull (City)	314,000
Leeds (City)	483,000
Leicester (City)	239,000
Liverpool (City)	856,000
Manchester (City)	766,000
Middlesbrough	138,000
Newcastle-upon-Tyne (City)	283,000
Norwich (City)	126,000
Nottingham (City)	269,000
Oldham	140,000
Plymouth (City)	208,000
Portsmouth (City)	252,000
Preston	119,000
St. Helens	107,000
Salford	223,000
Sheffield (City)	512,000
Southampton	176,000
Southend-on-Sea	120,000
South Shields	113,000
Stockport	125,000
Stoke-on-Trent (City)	277,000
Sunderland	186,000
Walsall	103,000
Wolverhampton	133,000

Wales

Cardiff (City)	224,000
Swansea	165,000
Rhondda	141,000

Scotland

Glasgow	1,088,000
Edinburgh	439,000
Dundee	176,000
Aberdeen	167,000

Northern Ireland

Belfast (1926)	415,000

Note.—The 'conurbations' of Greater Manchester, Greater Liverpool, Birmingham, and the Black Country, Tyneside, Leeds-Bradford, have all populations of over a million.

THE IRISH FREE STATE (SAORSTAT EIREANN or EIRE)

The Surface of Ireland. The larger part of Ireland is a plain, with greater stretches of nearly level country than are to be seen in any other part of the British Isles. The hills and mountains are chiefly near the corners of the island, and being from their nature thinly peopled, and not situated so as to separate more densely inhabited areas, present no serious obstacles to communication. The flatness of the country has facilitated the construction of both canals and railways. The Shannon, the longest river in the British Isles, is navigable from Lough Derg to the head of Lough Allen, that is, not far from its source; and it is connected by canals with Dublin by two routes, and with Belfast. The Shannon drops roughly 100 feet from Lough Derg to the sea at Limerick and advantage was taken of this fact to carry out the Shannon Power Scheme to supply electricity to the whole of the Irish Free State.

The first part of the scheme was completed in October 1929. The effect of superficial configuration on the railway communications in Ireland is to be seen rather in the lengthening of routes than in enforcing the crossing of high altitudes on important lines. The most serious deviations from the direct route are those due to the highland country on the adjoining borders of the counties of Tipperary, Waterford, and Cork, the railway from Cork to Waterford being thus compelled to run first 21 miles north (to Mallow) out of a total of 96 miles, and that to Dublin 36½ miles north (to Charleville) out of a total of 165½ miles.

It is partly owing to the flatness of the surface in Ireland, where the natural drainage is in consequence insufficient, that the extent of bog and marsh land is so large, making up one-twelfth of the entire surface. But it must be remembered that in all parts of Europe human industry applied to drainage works and cultivation has been necessary to conquer bog and marsh, and in Ireland, as in other parts of the world in which the climate is sufficiently moist, the extent of waste due to this cause increases where agriculture is neglected. In Ireland, too, the extension of bog and marsh is promoted by the fact that the situation of the island causes the climate to be particularly moist. The barren mountain land, woods, and water of Ireland being also deducted, there remains three-fourths of the surface available for agriculture, including the rearing of live-stock.

In respect of mineral resources Ireland is much less fortunate than Great Britain. Formerly the most productive coal-mines were those in the north of co. Kilkenny, but the quantity produced there is small and of inferior quality. Small quantities of iron ore occur, but there are excellent resources of granite and marble.

Relatively to population, Ireland rears more live-stock in the aggregate than any other country in Europe, and probably than any other country in the world, except 'new countries.' In certain species of live-stock the ratio of numbers to inhabitants is greater in one or two other European countries, but not the ratio of all collectively. This ratio in the case of Ireland has, moreover, been growing on the whole pretty steadily for many years, especially in the case of cattle, horses, and poultry. The quality of the animals reared has been greatly improved with the help of timely and wise legislation by the Government. But the Irish cattle are still largely sent to England and Scotland as store cattle to be fattened. This is undoubtedly due in a large measure to the fact that Great Britain forms the chief market for the meat, and it is advantageous to fatten the cattle near consuming centres. Of recent years, however, the value of fat cattle exported has approximated to that of store cattle. In the average quality of Irish butter and eggs great improvements have been effected through the agency of co-operative

creameries and other societies, especially in the south and west of Ireland. The establishment of these societies was due to the efforts of Mr. (afterwards Sir) Horace Plunkett. With much difficulty he succeeded in getting the first established in 1889. The number is now considerably more than a thousand.

The establishment in 1922 under Treaty with Great Britain of the Irish Free State as a self-governing Dominion has resulted in the publication of separate statistics which throw much interesting light on the trade between Ireland and Great Britain. The Irish Free State did not become a statistical unit for Customs purposes until after the setting up of a Customs frontier on April 1, 1923. The area of the Free State is approximately 26,592 square miles and the population 2,972,802 (in 1926), or 112 to the square mile. With this may be compared the area of Northern Ireland, 5,237 square miles ; population (1926) 1,256,322, or 239 to the square mile. In 1930 the total area under crops in the Irish Free State was 3,743,000 acres, of which hay occupied 2,296,000, oats 644,000, and potatoes 347,000 acres.

Before the separation of the Irish Free State it was only possible to form rough estimates of the trade between Ireland and Great Britain. First regarding exports ; in the case of cattle and other live-stock, butter, and eggs, poultry, potatoes, and bacon and hams exported, it may be safely assumed that these were practically all of Irish origin and all found their final market in Great Britain ; and it was interesting to compare the total Irish exports under these heads with the total imports of the same commodities into the United Kingdom. This showed that the value (though not the quantity) of eggs imported into Britain from Ireland was greater than that from any other single country, but butter was less than half that from Denmark.

Looking at the imports into Ireland, there was no difficulty in identifying the imported coal as all of British origin.

Taking the position as it was in 1908, as might have been expected, the bulk of the Irish butter sent to Great Britain was consumed on the west side of the island, whereas the principal markets of the Danish and other continental markets were on the east side. In all the large centres of population in Great Britain the best of Irish creamery butter was considered to be the best butter in the world. Although in recent years great progress has been made in the organisation of the dairying industry, Ireland still sends over quantities of non-creamery butter, which is not the case with any other country supplying the wholesale markets of Great Britain. Danish butter reaches Great Britain in nearly equal quantities all the year round, whereas the Irish trade is almost confined to the six summer months, a fact which has in various ways a prejudicial effect on the Irish trade. For that reason there has been strongly

urged the practice of winter dairying in Ireland. Ireland is keenly alive to the progress made by Denmark, and comparisons between the trade and industry of the two countries are commonly made in statistical publications.

Taking the post-War position, looked at as a whole the trade of the Free State presents two noteworthy features. First, unlike that of the United Kingdom, it shows a marked predominance of food and drink amongst the exports. Second, the value per head is high. On the side of imports the value per head in Ireland is considerably higher than in the United Kingdom. The important place—nearly 45 per cent. in 1929—occupied by manufactured goods amongst the imports is also noteworthy. This position has, however, been changed in the last few years by the 'economic war' between Britain and the Irish Free State and by the deliberate policy of the Irish Free State Government to make the country a self-sufficing unit. In 1929 the value of the exports was £47,000,000 (against imports £61,000,000). By 1934 this had fallen to £18,000,000 (imports £39,000,000). The products of Ireland (agriculture) and Britain (manufactures) are naturally complementary, and despite the 'war' (relieved to some extent by a cattle-coal exchange) over 90 per cent. of the export trade is to Great Britain and Northern Ireland.

Ireland has pre-eminently a climate suited to grassland and dairy farming rather than to the ripening of crops, but the present policy is to encourage the growing of food grains.

The chief Irish ports are Dublin, Cork, Waterford, and Limerick.

Towns of the Irish Free State, 1926

Dublin	317,000	Waterford	78,600
Cork	78,000	Limerick	39,000

IRISH FREE STATE

GENERAL IMPORTS

—	Percentages of Total Value.		
	1924.	1926–30.	1931–35.[1]
Livestock	—	—	1·9
Horses	—	2·1	1·5
Foodstuffs	—	—	*30·7*
Wheat and wheat products	10·8	10·2	7·6
Maize and maize products	6·4	5·6	4·4
Tea	3·8	4·1	4·1
Sugar	3·7	2·3	1·6
Bacon	2·8	2·9	0·8
Raw materials	—	—	*19·6*
Coal	6·4	5·6	6·5
Chemicals, drugs and paints	1·4	2·0	2·7
Petroleum	1·7	1·9	2·1
Oilcake and fodder	2·2	2·0	1·2
Manufactures	—	—	*47·6*
Apparel	6·4	7·3	5·5
Cotton yarns and manufactures	3·0	3·2	3·9
Woollen yarns and manufactures	2·3	2·6	3·1
Other textiles	—	2·1	3·1
Iron and manufactures	3·5	3·7	4·5
Other metals and manufactures	—	1·5	2·5
Machinery	1·6	3·0	3·7
Vehicles and parts	3·4	4·2	4·1
Paper and cardboard	1·6	1·9	3·0
Boots and shoes	3·0	2·4	2·4
Total value in £ millions	*64·5*	*58·6*	*40·6*
United Kingdom	81·1	77·4	69·6
United States	5·4	7·3	4·4
Germany	1·1	3·0	4·0
Argentina	3·3	4·0	3·2
Canada	2·1	1·7	2·5
Belgium	—	—	2·3

SPECIAL EXPORTS

—	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Livestock	—	—	*45·1*
Cattle	35·7	30·0	30·8
Horses	—	5·3	5·1
Pigs	2·4	4·8	3·2
Sheep	3·5	3·1	2·4
Foodstuffs	—	—	*43·4*
Stout, beer, ale	11·9	11·2	18·6
Butter	8·3	9·7	6·9
Eggs	6·4	6·8	5·9
Bacon	6·5	5·6	5·0[2]
Fresh pork	2·0	2·8	2·5
Poultry (dead)	1·7	1·6	2·0
Raw materials	—	—	*4·4*
Manufactures	—	—	*6·6*
Textiles (including apparel)	—	2·2	1·9
Total value in £ millions	*44·4*	*43·6*	*23·4*
United Kingdom	98·1	95·4	94·4
United States	0·5	0·5	0·8

[1] Classes 1931–33.
[2] Figures not strictly comparable after 1932, because they exclude hams.

FRANCE[1]

The area of France, including Corsica, is about seven-tenths larger than that of the British Isles, the population somewhat smaller. The density of population is thus less in France than in the British Isles, but in France the population is more evenly distributed.

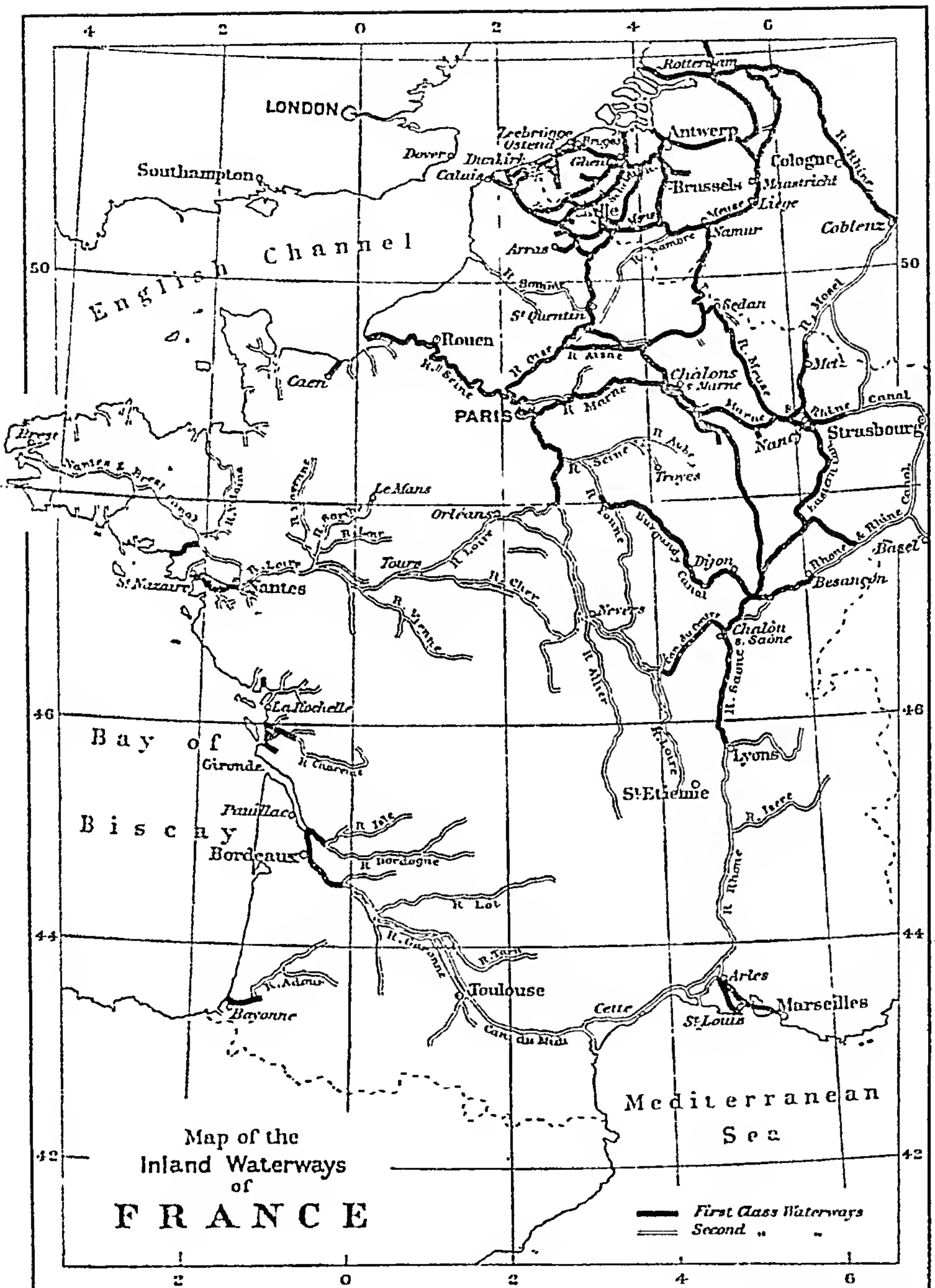
Surface. The greater part of northern France is made up of plains, gently rolling land, or broken hilly country offering little hindrance to communication. Lofty mountains, the Pyrenees and the Alps, form the land frontier on the south and south-east. If one excludes the line from Nice to Cuneo in Italy, completed in 1928, as yet the sole railway from France across the Alps is that which connects the valleys of the Isère and the Dora Riparia by means of the earliest of the longer Alpine tunnels, the so-called Mont Cenis tunnel, opened in September 1871. Even the French Jura and the Vosges, in the east, are much higher than any British mountains, and obstruct to a considerable extent communication with the adjoining countries. But the chief highlands within the French frontier are those of the so-called Central Plateau, which is really situated more to the south-centre. These highlands have an average height of from 2,500 to 3,000 feet. On the east they are bordered by the Cevennes, which sink abruptly down to the Rhone valley; farther west they are crowned by the remains of the old volcanoes (the *puys*) of Auvergne; and they are traversed by profound river valleys opening to the north and west. The climate of the surface is bleak and the soil unproductive, but this is to some extent compensated by the richness of some of the valleys. This is particularly the case with the expansion of the valley of the Allier called the Limagne (round Clermont), which the volcanic dust blown hither by the prevailing south-west winds from the mountains of Auvergne has helped to make one of the most fertile tracts of France. Altogether, the Central Plateau is a sparsely peopled region, but even its most thinly peopled districts are to be compared rather with the less populous parts of Wales and the north of England than with the highlands of Scotland. The level tract between the Adour and the Garonne on the south-west, embracing the maritime dunes of the

[1] I am greatly indebted to my colleague, Dr. Hilda Ormsby, for help in the revision of this section.

Landes, contains even less fertile land than the Central Plateau, and here also population is scanty and railways are wide apart. Corsica is highly mountainous, and, like other mountainous islands, has its population chiefly on the coast.

Rivers and internal navigation. The rivers of France are much more important as means of internal communication than those of England. Even the shortest of its great rivers, the Dordogne, is rather longer than the Shannon, and the Seine (with its tributaries, the Oise, Marne, Aube, and Yonne), the Loire, Dordogne, and Garonne, and the Saône, the chief tributary of the Rhone, as well as minor rivers, flow through plains and valleys presenting few obstructions to navigation for the greater part of their course. The impetuous Rhone, though navigable from Lyons, has its course impeded by sandbanks and other obstructions. Though the Treaty of Versailles gave to France large powers over the waters of the Rhine where it now forms part of the French frontier, the navigation of that river is more appropriately considered under Germany. The importance of the navigation naturally afforded by the rivers is shown by the canal connections between the rivers in the east and west. The Marne and Rhine Canal (with 180 locks), which crosses the northern end of the High Vosges at the height of about 1,100 feet, and unites the Rhine navigation to that of the Seine, begins at a point on the Marne about 300 miles above the mouth of the Seine. A branch running north connects it with the Saar navigation, and so with the Saar coal-field. The Burgundy Canal (with 191 locks), which connects the navigation of the Seine and Rhone by means of the Yonne and Saône, begins on the former river at a point about 275 miles above the mouth of the Seine, and ends on the latter rather more than 300 miles above the mouth of the Rhone. It crosses the Côte d'Or at the height of 1,230 feet, and passes Dijon. The Canal du Centre (with 84 locks) connects the Loire, about 400 miles from its mouth, with a lower point on the Saône, passing to the north of the Central Plateau at a height of about 1,000 feet at the summit. The Rhone and Rhine Canal (with 157 locks) quits the Saône near the point of entrance of the Burgundy Canal, and enters the Rhine valley through the opening known as the Burgundy Gate, between the southern end of the Vosges and the western slopes of the Jura. The Canal du Midi (with 99 locks) connects the Garonne at Toulouse with the Mediterranean to Sète (formerly Cette), traversing at the height of 625 feet the Passage of Naurouse or Gap of Carcassonne, between the Central Plateau and the Pyrenees.

The Marseilles-Rhone Canal, 10 feet deep, opened May 7, 1916, passes through a tunnel more than 4½ miles long. The accompanying map shows the inland waterways of France, distinguishing those of the first class having a minimum depth of 6½ feet, and locks



George Philip & Son Limited

Statute Miles 0 50 100

Natural Scale 1:8.000.000

of at least 126 feet in length and 17 feet in width. It makes clear the importance of Paris as a water-traffic centre, and that of the northern district, where the flatness of the country favoured canal construction and where there is a large amount of heavy traffic connected with the Belgian system. It shows also the rivalry that must exist between the French port of Dunkerque (Dunkirk) and the Belgian port of Antwerp in connection with that traffic. All the north of France east of 4° E. is in fact nearer Antwerp than Dunkirk by water. Inland water traffic is largely local. It is estimated that not much less than half the quantity of goods brought into Paris comes by water, which handles nearly one-third of all the traffic (in 1909 about $35\frac{1}{2}$ million tons ; in 1924 about $19\frac{1}{2}$ million tons on the river, 17 million tons on the canals, and in 1932, 50·9 million tons).

As regards **climate,** France has all the advantages of a westerly maritime situation, together with a more southerly latitude than the British Isles, and it is therefore to be expected that France should excel this country, as it does, in respect of the abundance and value of its agricultural products. The greatest contrasts of climate within a short distance are those between the south-west with its prevalent north-westerly winds of summer, bringing copious summer rains favouring the growth of maize, and the south-east with its typical dry Mediterranean summers, utterly unsuited for maize, but favourable to wine and fruit, as well as wheat. The Provence plain is exposed, especially in winter, to the violent cold northerly wind known as the mistral ; the neighbouring Riviera (Nice and Cannes) is not so exposed.

Less than one-fifth of the surface of the country is occupied by mountains, about a fourth by plateaus. This leaves more than one-half for the lowlands, which, it is true, are not everywhere fertile but nevertheless contain a large proportion of fertile soil. Though the ratio of the total surface of France to that of the British Isles is only $1\frac{3}{4}$: 1, the extent of corn-**crops** in France has in recent years been nearly $3\frac{1}{2}$ times as great as in the British Isles. Not many years ago the wheat-crop of France was next in amount to that of the United States among all the countries of the world, but before the War it was surpassed by that of Russia. In the five years 1909–13 it was estimated to form a fourth of the wheat-crop of Europe excluding Russia, and this is still approximately true. And in addition to wheat and other British crops France produces large quantities of maize (in the south-west), besides the less valuable rye and buckwheat, principally on the poorer soils of Brittany and the Central Plateau.

Besides corn-crops France produces all the ordinary British green-crops, potatoes and mangold, each covering more than twice as great an area as in the British Isles ; the vine, the most valuable of all the French crops, still covers, notwithstanding the devastations

of the phylloxera, an area as large as that occupied by wheat and barley together in the British Isles; the average of sugar-beet greatly exceeds the British average of that crop; and large areas are occupied by olive-groves, mulberries, for the rearing of silkworms (less important than formerly), colza, hemp, and flax, though the last-mentioned crop is smaller than that of Ireland. Tobacco is likewise a product of no little importance. Of great significance now are ' primeurs ' or early fruits and vegetables.

While the area under wheat in France is about eight times as great as that in Britain, the yield is far from being proportionately great; but in making such a comparison it should be borne in mind that the French grow wheat for their own consumption all over the country, while in the United Kingdom it is confined to the areas most favourable to its production in respect of soil, climate, and situation with reference to markets and foreign competition. Irrespective of high protective duties, wheat-growing on much of the land of France is naturally protected by the long railway transport necessary to reach the local markets. In these circumstances as high a yield per acre is not to be expected in France as in Great Britain. A steady improvement in French agriculture is, however, shown by the fact that in every decennial period from 1821–30, when the average yield of wheat per acre was 13¼ bushels, there has been a rise in the average down to 1881–85, when it amounted to 18 bushels, and again in 1901–10, when it amounted to 20 bushels, an average still maintained.

The leading French **fisheries** are mentioned elsewhere, but it may be noted here that under a law passed in June 1920 extensive government subsidies are given for the development of the deep sea fisheries.

The **mineral wealth** of France is of considerable importance. France has several small, and not very productive, coal-fields, scattered over different parts of the country, notably the central region, and one major field in the north of the country. The central fields are farthest from supplies of sea-borne coal and valuable on that account. The northern coal-field is a continuation of that of Belgium, and the chief centres of production are Lens and Anzin. Next in productiveness are those on or near the eastern side of the highlands which border the basins of the Rhone and Saône on the west—round St. Etienne in the middle, round Le Creusot farther north, and at Alès in the south. By the Treaty of Versailles the coal deposits of the Saar basin became the property of the French state, but as a result of the plebiscite of 1935 were restored to Germany. An extension of the Saar field into Lorraine has some importance. It is in the production of **iron ore** that France has shown a remarkable increase. The principal producing district has long been in the north-east in the basin of the Moselle, near Nancy and Longwy,

but the most productive part of that district, with Briey as its centre, was unknown till the eighties of last century, and various difficulties retarded development for some time after the deposits became known. It is necessary to obtain coke from either Germany or Belgium. The ores are basic ores containing from 36 to 40 per cent. of iron and from 8 to 16 per cent. of lime, of the same character in fact as the ores of the neighbouring deposits which were retransferred from Germany to France at the Treaty of Versailles. As these last ores were of peculiar importance in the economic development of the late German Empire they are considered in that connection (see p. 407). Other deposits were for long worked near Le Creusot, and more important deposits were later opened up in the west, especially in Normandy, near Caen. There has also been a certain production of Bessemer ores in the eastern Pyrenees, on the north-west and south-east slopes of Canigou. The potash deposits of Alsace, a little to the north-west of Mulhouse, are next in importance to those of Prussian Saxony. The Alsatian production of crude potash salts in 1913 was 355 thousand metric tons, yielding 65,540 tons of potash. The production of crude salts then sank to a minimum of 114,000 tons in 1915, but afterwards rose to 1,350,000 tons in 1922, yielding 230,000 tons of potash. In the depression years of 1932–34 the production averaged 350,000 tons of salts. Sea-salt is obtained from salt-pans on the western Mediterranean coasts and on the coasts of the Bay of Biscay ; rock-salt, near Nancy, in the north-east.

Since about the end of last century much has been done to develop what the French call ' white coal,' that is, water-power, which is furnished in great abundance especially by the Alpine torrents. There are important installations in the neighbourhood of Grenoble on the Isère, Romanche, and Drac, and recently the Rhone has been utilised where it enters France.

One consequence of the dispersal of the French coal-fields is the fact that localisation of the great French **manufacturing industries** is governed more by the position of local supplies of raw material and the conveniences for obtaining supplies from abroad and marketing the product than by the supply of fuel.

The earliest centre of the iron industry is Le Creusot, which, while the industry was still small, was favourably situated in respect of all the bulky raw materials. It is still noted for the making of machinery, locomotives, and other railway material, as well as other important branches of the iron and steel manufacture, including the Schneider armament works now taken over by the Government. There are important engineering works at Lille, St. Etienne, and Paris. Since the development of the Briey basin a great iron industry has grown up there ; indeed, a great iron and steel industry has developed on the whole of the Lorraine iron-fields. Pig-iron

is made from local ores near Caen. An important feature of the industry in recent years in the south-east has been the application of water-power in electric furnaces for the production of the finer kinds of steel.

Paris, the capital of the country, is, like London, too large to be specially identified with any particular industry, but is the seat of a large number, more particularly those concerned in the production of articles of luxury, such as are in greatest demand in a large capital. Jewellery and perfumery, furniture, porcelain, glove-making and the making of fashionable clothing and footwear, and a variety of fancy wares, are all notable Parisian trades. The celebrated porcelain work which gave name to Sèvres porcelain is now carried on at St. Cloud, immediately to the north of Sèvres, on the left bank of the Seine, to the west of Paris proper. The central position of Paris in the great northern plain of France, just below the junction of the Marne and Seine, has been in favour of its acquiring and retaining the rank of capital, and the fact of its being the capital and centrally situated makes it without a rival in the country in trade and population. Coal is imported from South Wales *via* Rouen and from the northern coal-field.

The woollen industry is chiefly carried on in the north, where there are the principal supplies of native wool, and where supplies of foreign wool are most easily obtained from the River Plate and from Australia, where also, in addition to easily accessible coal supplies, the seats of the industry are intermediate between two of the most important markets for woollens in the world, London and Paris. The principal markets for wool in France in the order of importance are Roubaix, Tourcoing, Fourmies, Rheims, and Amiens. Roubaix, Tourcoing, and Fourmies are all close to the northern frontier and are most directly supplied by way of Dunkerque; Rheims lies beside the sheep-pastures of Champagne, a region similar to the English downs, which has fostered a trade in wool and woollen-manufactures at Rheims from a very early period. Amiens, on the Somme, is almost equally accessible from the ports of Havre and Rouen in the south and Dunkerque in the north. All these towns are also noted for their woollen manufactures, those of the closely adjoining towns of Roubaix, Croix, and Tourcoing including carpets. Sedan, on the Meuse, in the north-east, is another old manufacturing town engaged in the same industry, fostered by the sheep-pastures of Ardennes. Elbeuf, on the Seine above Rouen, and Louviers, a little to the south-east, are noted for their woollen (as distinguished from worsted) cloths; and Troyes, on the upper Seine, has long been noted as the chief seat of French hosiery.

The advantages for textile manufactures in the extreme north are not confined to woollens, and Lille, the largest manufacturing town of this district, with Roubaix and Tourcoing, has linen, cotton,

as well as woollen, and other textile industries, the first-mentioned branch being favoured by the fact that the part of France to which it belongs produces excellent flax in the Scarpe and Lys valleys. To the south-east of Lille, on the Escaut, stands Cambrai, which gives name to cambric and is famed for fine linens.

The silk-manufactures still have their chief seats in the valley of the Rhone, where they first grew up in consequence of the introduction of the silkworm. Lyons (*Lyon*), the third town in France in point of population, the birthplace of the inventor of the Jacquard loom, is the town whose name is most intimately associated with this industry in all its branches. It lies at the confluence of the Saône and Rhone, partly on the left bank of the latter river, partly on a small alluvial flat between the two, and immediately overlooked by the hills which skirt the right bank of the Saône. Next in importance to Lyons in connection with this industry is St. Etienne, which supplies Lyons with coal. Both it and Lyons have excellent water for dyeing. Avignon, on the Rhone below Lyons, and Nîmes and other towns in the valley are also engaged in the silk industry, which likewise employs large numbers in Paris. The textile industries of the lower Rhone valley, the southern Jura, the Alps, and the upper Loire basin may be regarded as tributary to Lyons.

In the cotton industry the restoration of Alsace to France has given this part of the country once more the leading place. Textile manufactures as a domestic industry had long been carried on in the hamlets of the Vosges valleys, and these supplied much of the labour required under modern conditions. Calico printing was started at Mulhouse as early as 1746, and this led to the establishment of cotton spinning and weaving in which steam power began to be used in 1812. Colmar, Guebviller, and other places in the neighbourhood, where power afforded by the torrents of the Vosges can be used to supplement steam, are also engaged in the industry. After the transference of Alsace to Germany in 1871, cotton factories were established at Sénones, St. Dié, Epinal, and other places west of the Vosges ; but outside of Alsace the cotton manufacturing towns of Normandy, and above all Rouen, are pre-eminent. Further north the chief cotton-market is St. Quentin, to the south of Cambrai. Another important centre is Roanne on the Loire.

Limoges, on the Vienne, is noted for its porcelain and earthenware. Both coal and kaolin are obtainable at no great distance, though they lie in different directions from the town. Glass is made on or near the coal-fields of the north and centre, generally in the immediate vicinity of fine sand ; paper at Angoulême in the west, and Annonay in the east ; watches at Besançon in the Jura, though the chief industry of this last town consists mainly in putting together parts of watches made in the Swiss Jura. The manufacture of kid gloves is carried on in nearly every village within a radius of forty

miles of Grenoble in the Alpine valley of the Isère. Strasbourg carries on a variety of manufactures, and is also important as an administrative and commercial centre. The completion in 1907 of the works designed to make it a great river port stimulated its industrial activity, notwithstanding the barrier placed between it and its most accessible large market by the change of frontier made in 1919. In 1896 the port received 211,000 tons of Ruhr coal; with the improvement of the port this increased to 904,000 tons in 1912. Similarly the total traffic grew from 2 million tons in 1913 to 7 million in 1928.

The principal French seaports in the order of their importance are Marseilles, Le Havre, Rouen, Dunkerque, Bordeaux, La Rochelle with its outport of La Pallice, Nantes with its outport of St. Nazaire, and Cherbourg. This order is according to tonnage of goods, but the order is liable to vary according to the amount of coal imported at Rouen.

The priority of Marseilles, distant as it is from the capital and the great northern seats of industry, is due to the fact of its being the only first-class port on the Mediterranean Sea. The Rhone delta itself is too marshy, the mouth of the Rhone too much encumbered by sandbanks, to have afforded a favourable situation for the rise of a port, and hence Marseilles was founded on the nearest place on the coast where nature had furnished the conditions which the delta of the Rhone denied. Ever since its foundation by a body of Greek colonists from Phocæa in Asia Minor, about 600 B.C., it has been a great seat of commerce and shipping. The Rhone valley, besides being itself rich and productive in various ways, affords access to the plains of northern France and Belgium through the valleys of the Loire and the Seine tributaries along the routes indicated by the position of the canals already named, to the Middle Rhine valley by the Burgundy Gate between the Vosges and the Jura, to the tableland of Switzerland by way of Geneva through the narrower opening between the Jura and the Alps. The advantage of some of these connections was, however, considerably reduced by the piercing of the Alps by railway tunnels; and especially by the construction of the St. Gotthard tunnel, which gives to Genoa a shorter route to Antwerp than that from Marseilles. Within France, however, there is no railway route on which the gross receipts per mile are so great as on that from Marseilles to Paris. The position of Marseilles causes its trade to be chiefly with the Mediterranean and the East, and this is one of the ports benefited by the opening of the Suez Canal. Among its chief imports are wine, wheat, oil-seeds, sugar, coffee, hides, silk, pepper, and other Eastern products. Among its local industries may be mentioned particularly the refining of oil and the making of soap, stimulated by the local supplies of olives, and the import of olives from Italy

and of various oil-seeds from India and the East generally, as well as from Africa. There is also a large manufacture of macaroni from hard wheat imported from Italy. Marseilles is the headquarters of the great steamship company known as the *Messageries Maritimes*, which carries on an extensive commerce with the East and the Pacific. It has a regular traffic with the north African coast and has benefited greatly by the extension of the modern port. Moles have been constructed parallel with the coast and connection is made by the Roue canal tunnel with the Etang de Berre, which may now be regarded as an annexe of the port.

Sète, on the west of the Gulf of Lions, has mainly a local importance through being the terminus of the Canal du Midi. At present Marseilles has only Genoa as a rival on the Mediterranean, but it was not so in the Middle Ages, when ships were smaller and some French Mediterranean ports existed which are no longer accessible. Even then Marseilles ranked first, but the ships of Arles on the Rhone were to be seen side by side with those of Marseilles in the most distant parts of the Mediterranean. Narbonne continued to be an important port till the fourteenth century, but in 1320 a breach in the embankment of the Aude caused that river to leave the town, which the Robine branch of the Canal du Midi did not serve to restore. Aigues Mortes, in virtue of a canal connecting it with the sea, was once a great resort of maritime shipping, and lingered on as a seaport till Sète was fixed upon as the eastern terminus of the Canal du Midi, which was opened in 1681. Then the efforts to fight against the deposits of sand and silt ceaselessly brought by currents with a westerly set to the Languedoc coasts of the Mediterranean were abandoned, and Aigues Mortes was allowed to fall into decay. The port of Sète requires constant attention to preserve it from the same fate.

The commerce of France on the western and north-western coasts is in the aggregate much greater than that on the Mediterranean, but is divided among a greater number of large seaports. Havre, or Le Havre, at the mouth of the Seine, founded in 1509 by Louis XII, has grown to be 'the haven' of Paris since its harbour was extended and improved by his successor Francis I., and since the elder seaport of Harfleur, a little higher up, declined through the silting up of its harbour. It is the chief seat of trade with America, and hence the chief place of import of North American cotton, tobacco, wheat, animal produce, &c., and of South American coffee, for which it is now the principal European *entrepôt*, a position which is favoured by the possession of a highly organised market, though this again may be regarded as a natural growth at a port which is at once the most favourably situated for supplying one of the largest consuming countries in Europe, and the first touched at on the routes to the other large markets farther north.

Steps have been taken for large port installations at Honfleur on the south side of the estuary of the Seine. Since 1887 the Tanearville Canal has afforded direet communieation between the ports of Havre, Harfleur, and the Seine, thus enabling smaller vessels to avoid the dangerous navigation of the estuary of the Seine. Rouen has since the same date taken away some of the trade of Havre, the Seine having been deepened and straightened up to that port, where vessels drawing as much as 22 feet can lie afloat alongside parts of the quays.

In the north Havre has latterly been exposed to the keen rivalry of Dunkerque or Dunkirk, the only French port on the North Sea, a port which in recent years has been the most rapidly rising of all French ports, in consequence of its being so favourably situated for the supply of the northern manufacturing towns with their imported raw materials (above all, South American wool), and for the export of their manufactured products, including iron, beetroot-sugar, and oils. Its harbour can now accommodate vessels up to 600 feet in length with a draught of 30 feet. Rouen has been made into a first-class port by the improvement of the Seine and at times exceeds even Marseilles in the tonnage handled.

Bordeaux, on the Garonne, a little above the place where the estuary of the Gironde is formed by the confluence of the Dordogne, has long been the chief place of export of French wines. For vessels of the largest class it has an outport in Pauillac, on the left bank of the Gironde. La Rochelle, as the outlet of the middle parts of western France, has acquired importance chiefly since the inauguration in 1891, about 3 miles to the west, of its output of La Pallice with accommodation for large vessels. St. Nazaire, at the mouth of the Loire, like Pauillac, grew in importanee through the introduction of large shipping, and also through the silting up of the Loire at Nantes. It is capable of accommodating ships of the largest size, and is famed for its shipbuilding yards. Here was built the largest steamer in the world, the *Normandie*. Nantes, after being almost closed to sea-going vessels, has been restored to the position of a considerable seaport by the construetion of a ship canal admitting vessels up to a draught of 20 to 21 feet. Since then the Loire below Nantes has been dredged, so increasing the seour of the river that large vessels can now go up to Nantes. Cherbourg, on the northern peninsula of Normandy, has obvious advantages as a calling-place for continental steamers similar to those of Southampton.

The five naval stations of France are Cherbourg, on the English Channel, nearly opposite Portsmouth; Brest and Lorient, in Brittany; Rochefort, on the Bay of Biscay; and Toulon, on the Mediterranean. At all of these are government dockyards, and there are private shipbuilding yards at all the chief commercial ports.

Of the inland towns of France not connected with any special industry the most worthy of mention are Toulouse, on the Garonne, at the confluence of the Canal du Midi ; Orléans and Tours, on the Loire ; Angers, at the confluence of the Mayenne and Sarthe. Dijon and Macon are important centres of the trade in burgundy wine, Rheims and Epernay of that in champagne. Strasbourg is the great centre of the Rhine valley.

The tables on pages 377–80 indicate clearly the rapid increase in industry in France, to some extent at the expense of agriculture. This is summarised by the following figures :

	Imports of raw materials.	Exports of manufactures.	Wheat Acreage.	Males actively employed on the land.
	Millions of metric tons.		Millions.	
1913	37·16	2·28	16·0	5·3 (1911)
1923	47·71	3·04	13·7	3·9
1934	38·05	3·49	13·3	—

TOWNS OF FRANCE, 1931

Paris . . .	2,891,000	Strasbourg . .	181,000
Marseilles . .	801,000	Le Havre . .	165,000
Lyons . . .	580,000	Toulon . . .	133,000
Bordeaux . .	263,000	Rouen . . .	123,000
Nice . . .	220,000	Nancy . . .	121,000
Lille . . .	202,000	Roubaix . .	117,000
Toulouse . .	195,000	Rheims . . .	113,000
St. Etienne . .	191,000	Clermont-Ferrand .	103,000
Nantes . . .	187,000		

FRANCE

SPECIAL IMPORTS, EXCLUDING BULLION AND SPECIES

Principal Articles.	Average Value in Millions Sterling.[2]									Percentages of Total Value.								
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'24–29	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'24–29
1. Wool, raw and waste	12·59	12·36	14·33	13·49	16·75	16·39	24·35	26·82	38·67	8·9	6·7	8·5	8·3	9·8	9·0	9·8	8·2	8·8
2. Cotton, raw	8·94	7·93	7·45	7·45	7·72	11·99	17·23	22·12	38·35	6·3	4·3	4·4	4·6	4·5	6·6	7·0	6·8	8·2
3. Coal, coke, etc.	6·84	6·72	6·83	7·02	9·91	10·54	16·19	19·31	31·32	4·8	3·6	4·0	4·3	5·8	5·8	6·5	5·9	7·1
4. Silk, raw, thrown, waste, etc.[1]	*14·77*	*11·96*	*10·33*	9·28	10·39	11·77	13·96	12·73	17·91	*10·4*	*6·5*	*6·1*	5·7	6·1	6·4	5·6	3·9	4·1
5. Oil-seeds and fruits	4·59	6·69	6·34	7·18	6·21	8·46	11·48	6·41	20·04	3·2	3·6	3·8	4·4	3·6	4·6	4·6	1·9	4·6
6. Machinery	0·99	2·80	1·71	2·18	3·63	4·61	8·58	12·16	14·21	0·7	1·5	1·0	1·3	2·1	2·5	3·5	3·7	3·2
7. Hides and skins, raw	6·36	7·10	6·83	6·06	5·26	6·37	7·30	8·79	9·72	4·5	3·8	4·0	3·7	3·1	3·5	3·0	2·7	2·3
8. Common timber	5·72	8·08	6·38	6·05	6·28	6·76	7·14	7·13	9·29	4·0	4·4	3·8	3·7	3·7	3·7	2·9	2·2	2·1
9. Rubber and gutta-percha	—	—	—	—	1·55	2·63	6·99	8·75	6·59	—	—	—	—	0·9	1·4	2·8	2·7	1·5
10. Wine	0·79	14·30	17·06	9·97	10·45	5·17	5·95	11·99	13·48	0·6	7·8	10·1	6·1	6·1	2·8	2·4	3·7	3·1
11. Copper	1·49	1·60	1·68	1·52	3·36	3·42	5·62	7·29	9·31	1·0	0·9	1·0	0·9	2·0	1·9	2·3	2·2	2·1
12. Coffee	3·11	3·53	5·35	6·11	4·55	3·72	4·39	7·81	14·59	2·2	1·9	3·2	3·7	2·7	2·0	1·8	2·3	3·3
14. Flax	3·27	2·60	2·31	2·35	2·43	3·17	3·30	4·31	3·69	2·3	1·4	1·4	1·4	1·4	1·7	1·3	1·3	0·9
16. Wheat and flour	—	—	8·51	10·79	5·60	2·26	2·92	13·38	22·80[4]	—	—	5·0	6·6	3·3	1·2	1·2	1·1	5·2[4]
Total grain	10·45	15·91	13·25	—	—	—	—	—		7·3	8·6	7·8	—	—	—	—	—	
19. Cottons	2·54	2·87	1·84	1·47	1·63	2·02	2·44	3·57	7·71[5]	1·8	1·7	1·1	0·9	0·9	1·2	1·0	1·9	1·8[5]
27. Wool manufactures	3·06	3·34	2·68	2·23	1·73	1·57	1·70	2·17		2·2	1·8	1·6	1·4	1·0	0·9	0·7	0·7	
Average total value	141·9	183·4	168·8	163·0	171·5	182·8	247·3	327·0	430·03									

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES OF TOTAL VALUE)

From	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29	To	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. United Kingdom	18·7	14·3	12·8	12·7	12·9	12·4	13·7	12·8	10·6	United Kingdom	26·2	26·2	26·5	29·4	30·9	28·1	22·9	21·3	16·7
2. Germany	8·4	9·6	8·0	8·1	8·1	9·5	10·8	12·4	9·3	Belgium	13·4	—	14·6	14·8	14·7	15·0	15·5	17·2	14·9
3. French Possns.	5·2	3·7	7·0	9·0	9·4	10·2	10·8	—	9·3	Germany	10·6	9·9	9·3	10·3	10·8	12·0	12·3	13·1	9·9
Algeria	*3·3*	*2·2*	*3·9*	*4·8*	*5·1*	*5·1*	*4·9*	*4·7*	*4·9*	French Possns.	4·9	5·6	6·5	9·2	10·9	12·2	12·3	13·3	13·3
4. United States	5·9	7·9	7·1	9·6	10·8	10·6	10·5	10·6	12·6	*Algeria*	*3·8*	*4·7*	*5·2*	*5·9*	*6·3*	*6·7*	*7·1*	*8·5*	*7·4*
5. Belgium	12·6	10·1	10·6	9·5	7·6	7·1	6·9	6·6	7·4	*Tunis*		-	*0·5*	*0·6*	*0·8*	*1·1*	*1·5*	*1·6*	1·5
6. British India	2·8	4·8	4·5	5·1	3·8	5·0	5·2	4·6[3]	5·2	*Indo-China*	—	—	*0·3*	*0·5*	*1·0*	*1·6*	*1·2*	*1·2*	2·2
7. Russia	4·9	4·7	4·7	5·3	5·2	5·3	4·7	5·4	1·4	United States	8·3	9·2	8·2	7·0	6·3	6·0	7·3	6·4	6·3
8. Argentina	2·6	3·8	4·9	4·4	5·8	5·5	4·6	4·4	4·1	Switzerland	8·1	6·7	6·4	5·6	5·3	5·7	6·1	6·3	6·3
9. China	1·7	1·8	2·6	3·0	3·5	3·9	3·0	2·8[3]	3·2	Italy	5·8	5·5	4·6	3·7	4·0	4·1	5·0	1·7	4·2
10. Italy	10·0	8·1	5·0	3·2	3·3	3·3	2·9	2·6	3·0	Spain	3·4	4·8	4·9	3·9	3·0	2·7	2·3	2·3	3·2
11. Australasia	—	—	0·5	1·5	2·0	1·7	2·8	3·4[3]	4·0	Argentina	2·1	3·1	3·8	1·6	1·4	1·4	2·3	2·4	2·1
12. Spain	3·4	7·7	8·7	6·3	6·2	3·6	2·8	3·1	2·5	Russia	1·1	0·6	0·4	0·6	0·9	1·3	1·2	1·1	0·3
13. Brazil	1·3	1·2	1·6	1·9	1·8	1·9	2·1	2·3	2·2	Turkey	2·1	1·3	1·5	1·6	1·3	1·1	1·2	1·3	0·9

For notes, see page 378.

FRANCE

SPECIAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.[2]									Percentages of Total Value.								
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	1911–13	'24–29	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'24–29
1. Cottons	2·85	3·75	4·46	4·23	5·87	7·96	12·78	14·49	24·96	1·9	2·7	3·2	3·2	3·9	4·6	5·7	5·9	5·8
2. Silks	17·54	10·35	9·68	9·77	10·44	11·46	12·68	12·78	29·74	12·2	7·6	7·0	7·3	7·0	6·6	5·7	5·2	6·9
3. Wool, raw combed, waste	3·85	3·86	5·39	5·00	7·81	9·16	11·58	13·07	16·07	2·6	2·8	3·9	3·7	5·2	5·2	5·2	5·3	3·7
4. Woollens	12·66	14·37	14·20	12·00	10·19	8·46	8·72	7·90	19·46	8·7	10·6	10·3	9·0	6·8	4·8	3·9	3·2	4·5
5. Wine	10·13	9·83	10·05	8·82	9·05	9·14	8·64	8·22	8·50	7·0	7·2	7·3	6·6	6·0	5·2	3·9	3·3	1·9
6. Haberdashery	—	5·32	5·45	6·17	6·28	6·60	7·53	—	—	—	4·0	4·0	4·6	4·2	3·8	3·4	—	—
7. Raw silk	4·57	6·60	5·36	4·74	4·81	6·09	6·81	6·29	2·87	3·1	4·9	3·9	3·5	3·2	3·5	3·1	2·5	0·7
8. Apparel	3·33	3·01	3·87	4·73	4·51	5·08	5·86	9·40	22·44	2·3	2·2	2·8	3·5	3·0	2·9	2·6	3·7	5·1
9. Motor vehicles, from 1897	—	—	—	—	0·16	2·15	5·74	7·83	15·88	—	—	—	—	0·1	1·2	2·4	3·2	3·7
10. Chemicals, excluding dyes	1·71	2·42	1·93	2·26	3·08	3·91	5·46	7·80	23·16	1·2	1·8	1·4	1·7	2·1	2·2	2·4	3·1	5·4
11. Millinery	—	—	—	1·96	3·31	4·95	5·20	3·40	1·78	—	—	—	1·5	2·2	2·8	2·3	1·3	0·4
12. Iron and steel and manufrs.	—	—	—	—	2·85	4·20	5·14	—	—	—	—	—	—	1·9	2·4	2·3	—	—
Metal wares.	3·22	2·74	3·04	2·92	3·61	—	—	6·07	16·24	2·2	2·0	2·2	2·2	2·4	—	—	2·5	3·7
13. Hides, raw	1·54	2·83	2·53	2·84	3·49	4·81	4·86	6·61	6·80	1·1	2·1	1·8	2·1	2·3	2·8	2·2	2·6	1·6
14. „ tanned	3·79	4·19	4·02	4·01	4·32	4·75	4·36	6·79		2·6	3·1	2·9	3·0	2·9	2·7	2·0	2·7	—
15. Machinery	—	—	1·47	1·47	2·16	2·37	3·67	4·69	12·72	—	—	1·1	1·1	1·4	1·4	1·4	1·9	3·2
18. Leather wares	5·53	5·86	5·41	4·08	2·98	2·55	3·16	3·37	3·74	3·8	4·3	3·9	3·1	2·0	1·5	1·4	1·3	0·9
24. Sugar, refined	4·82	2·72	2·26	1·99	1·82	1·91	2·18	2·89	} 4·75	3·3	2·0	1·6	1·5	1·2	1·1	1·0	1·1	} 1·1
33. „ raw	2·43	0·71	1·14	1·86	2·79	1·86	1·20	0·27		1·6	0·5	0·8	1·4	1·8	1·1	0·5	0·1	
Average total value	141·0	135·3	137·6	133·8	150·2	174·7	222·9	253·0	432·9									

The most notable changes among the exports are those of cottons, woollens, and iron and steel manufactures. The marked rise of the position of the cotton exports is mainly due to the preference accorded to French goods in French colonies and dependencies, and the decline under woollens chiefly to the diminishing importance of the British market for those goods owing to the development in Great Britain of the branches of the woollen industry for the products of which that country formerly looked largely to France. The marked rise of iron and steel manufactures is sufficiently explained in the text, and this again indicates the chief explanation of the notable advance in the import of coal, coke, etc., shown in the imports table.

[1] Raw silk includes yarns in earlier group, value for which for 1891–95 was £9·53 million (5·8 per cent.).
[2] Rate of exchange for 1924–29 is the average for each 12 months: 1924, 85·18; 1925, 102·54; 1926, 150·70; 1927, 123·85; 1928, 124·10; 1929, 124·04 frs. = £1.
[3] Figures for 1913 only. [4] Grain, flour, malt. [5] Yarns and tissues, 1925–29.
Note.—Chemicals, 1924–29 = Chemicals crude *and* drugs and chemicals manufactured.

FRANCE

SPECIAL IMPORTS

	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Foodstuffs	—	*20·7*	*20·4*
Grain, flour, malt	4·8	5·1	6·3
Table fruits	1·1	1·7	3·5
Coffee	3·3	3·0	2·9
Sugar	2·5	1·4	2·9
Wine	—	3·7	1·6
Raw materials	—	*53·8*	*27·8*
Oil-seeds and fruits	4·4	4·5	8·1
Timber	2·3	2·3	2·0
Metals	—	6·1	4·2
Mineral oils	3·0	4·7	5·8
Coal, coke, etc.	·9·3	7·1	8·5
Wool	7·6	8·7	5·1
Cotton	9·6	7·2	4·5
Chemicals	2·2	4·4	4·0
Manufactures	—	*16·2*	*12·5*
Pulp and paper	—	2·0	2·3
Machinery	2·8	4·1	4·7
Yarns and tissues	—	1·9	1·8
Bullion and specie	—	*8·7* [1]	*33·8*
Total in 1,000 million francs	*40·1*	*55·4*	*28·9*
Countries:			
Germany	5·0	10·4	11·1
United Kingdom	12·4	10·5	7·8
Algeria	—	5·2	11·2
Belgium	6·6	7·2	7·4
United States	14·3	14·4	9·4
India	1923 = 5·2	4·7	2·6
Australia	1923 = 3·9	3·9	2·4
Argentina	4·5	3·7	2·6
Netherlands	2·9	3·2	2·7
Italy	3·8	2·9	2·3
China	1923 = 2·4	2·8	0·9
Spain	2·1	2·6	2·4
Switzerland	1·7	1·8	2·2
French West Africa	1·0	1·5	1·8

[1] Hardly any before 1928.

FRANCE

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*11·3*	*11·8*		
Sugar	1·0	1·3	2·1		
Wine	2·1	2·0	2·2		
Raw materials	—	*20·7*	*14·7*		
Iron and steel	4·3	5·6	6·9		
Wool	3·3	3·8	3·7		
Minerals and metals (excluding iron and steel)	0·7	1·9	2·5		
Coal, coke, etc.	—	1·5	1·8		
Manufactures	—	*66·7*	*53·9*		
Silk manufactures	7·3	6·3	4·1		
Cotton manufactures	6·1	5·6	4·8		
Woollen manufactures	5·9	4·1	2·0		
„ yarn	1·7	2·5	1·9		
Chemicals and drugs	2·6	4·9	7·7		
Other yarns and textiles	—	3·1	3·5		
Apparel and hats	8·4 [1]	4·4	2·1		
Tools and metal wares	2·6	3·8	4·1		
Machinery	2·8	3·4	4·7		
Motors	3·7	3·2	3·2		
Paper and its manufrs.	2·0	1·6	2·6		
Total in 1,000 million francs	*41·5*	*51·7*	*20·4*		
Countries:					
United Kingdom	18·9	16·5	10·9		
Belgium	17·2	14·4	11·5		
Algeria	—	8·0	16·3		
Germany	9·1	9·8	9·0		
Switzerland	6·3	6·5	7·3		
United States	7·6	6·2	4·8		
Italy	3·6	4·1	3·2		
Netherlands	2·8	3·0	3·1		
Spain	2·8	3·0	2·1		
Morocco	1·7	2·3	3·0		
Tunis	1·3	1·7	3·4		
Argentina	1·7	2·1	1·7		

[1] Includes linen goods.

Exchange rates: 1924 to 1929, see page 378; 1930 and to September 21, 1931, 124·21 francs = £1 (par); 1932–35, about 75 francs = £1.

For Towns of France, see page 376.

BELGIUM

The surface of Belgium is made up of a tableland (the Ardennes), intersected by deep river valleys, in the south-east, sloping down first to low undulating land and then to low flat plains, partly below sea-level, in the north and west. Between these two main physical regions lies the long narrow coal-field. The plains afford admirable facilities for inland navigation by both river and canal, and these facilities are still undergoing extension.

The high density of population is pretty uniformly distributed over the greater part of the country. Only the Grand-Duchy of Luxembourg, in the south-east, on the tableland of the Ardennes, has a density of population low enough to be compared with that of the English county of Hereford. Another district of low density is that called the Campine, on the north-east—a sandy plain, formerly heathy or marshy, but now partly reclaimed, and producing excellent butter, the best, it is said, in Belgium. This high density of population is due, as in England, both to advanced agriculture and to the great development of manufacturing industries, the latter being favoured by abundance of the minerals most essential to modern manufactures, as well as by admirable facilities for transmarine and inland commerce. Two languages are spoken by the bulk of the population—Flemish by those living north of a line drawn from the south of the province of West Flanders to the north of that of Liége, French by those to the south of the line.

Three-fourths of the surface are in crops, bare fallow, and grasses, the principal crops being wheat, rye, and oats. Among the minor crops are beet, including sugar-beet, buck-wheat, and flax. Flax is grown mainly in the district drained by the Lys, a left-bank tributary of the Escaut, and the fibre obtained from it has long been known for its excellent quality, which is due to the circumstance that the district named is remarkably free from lime salts, in consequence of which the water of the Lys is peculiarly well suited for the cleansing of the fibre. The centre of the trade in this commodity is Courtrai.

At the last agricultural census of Belgium 36 per cent. of the surface in cultivation was cultivated by the owners themselves. Most of the landed properties are small, but small farming is even

more general than small property-holding, the size of the majority of the holdings being about as small as those on the plains of Bengal. The productiveness relatively to area is very high, and this is not due to natural fertility, except in the rich polders or embanked areas reclaimed from the sea.

The **mineral wealth** of Belgium consists chiefly in coal and zinc. The chief coal-field may be described as occupying the valleys which intersect the Belgian plateau from the eastern frontier near Aachen (Aix-la-Chapelle) to about the middle of the Franco-Belgian frontier, the principal valleys in this respect being those of the Sambre and that part of the Meuse valley which continues the line of the valley of the Sambre. Geologically, this strip is formed by a series of Carboniferous strata lying on the north-western margin of a Devonian plateau which extends eastwards into Germany. The chief coal-mining districts are round Mons (the Borinage district), in Hainaut, near the French frontier, and round Charleroi in eastern Hainaut. The second field is the Campine coal-field extending westwards from Dutch Limburg to near Antwerp, through a length of about 50 miles with a width of about 7 to 12 miles. The aggregate thickness of workable coal-seams (with a minimum of 16 inches) in this area varies from 3 to 26 feet. Much of the coal is ' long flame,' well adapted for use in glass and pottery making. The first ton of coal was extracted from this coal-field at the end of 1917 ; production in 1922 had increased to 428,000 tons, and in 1929 to 3,200,000. Zinc is obtained at Moresnet, close to the eastern frontier between Verviers and Aix. There are also productive lead-mines near Verviers. Excellent glass sands are found especially in the Campine. Iron ore exists, including bog iron ore in marshy parts of the Campine, but the production is small, and the high place which Belgium takes in the iron industry (see p. 265) is mainly due to its wealth in coal and its geographical situation, under which head one must take into account the proximity of the very abundant iron ores of the Grand-Duchy of Luxembourg (see p. 398) and the north-east of France (see p. 370).

The **manufactures** stimulated by the existence of this mineral wealth are numerous and varied, and it is worthy of notice that the textile manufactures which predominate are those originally stimulated by local supplies of raw material, namely flax and wool. The tables of Belgian exports given below show that linen and woollen yarns are the chief special exports that may be classed under this head, and the former branch is fostered by the advantages for flax-growing already referred to, the latter by the sheep-pastures of the Ardennes, as well as by the large supplies of wool obtained from the River Plate. The spinning and weaving of linen are carried on chiefly at Ghent, Tournai, Courtrai, and other western towns (in Flanders) in or near the flax-growing region ; but the

linens of Courtrai are not made with the fine fibre of native production, but of coarser material formerly imported from Russia. The town most noted for its woollen cloth is Verviers, which lies close to the Ardennes and the coal-supplies of Liége. Ghent is the centre of the cotton-manufactures. Brussels, the capital of the country, has numerous industries, but is not specially a manufacturing town, though it may be here mentioned on account of its lace. The sixteenth-century Willebroeck Canal has been so far improved as to allow of small sea-going vessels reaching Brussels.

Verviers presents a remarkable instance of the persistence of an old industry, its woollens having been noted as far back as 1432. It also exports very large quantities of woollen yarn, or a hybrid between woollen and worsted yarn, and of washed wool, the last branch of the industry being due to a local advantage turned to account by science and common sense. A committee having ascertained that the presence of lime in water is prejudicial to the scouring of wool, a dam was constructed across a small stream in the neighbourhood which flows over slate and sandstone, and the water of which is free from the noxious ingredient. By that means an abundant supply of suitable water was obtained.

Next in rank to textile manufactures in the aggregate among Belgian mechanical industries stand those connected with the working of iron. Among these the making of machinery is first in importance, and the chief seat of this branch is Liége with its suburb of Seraing. Liége, which can be reached by barges of 1,000 tons, was one of the most important seats of the manufacture of firearms in the world.

The situation of Liége is highly characteristic of the eastern towns of Belgium generally. The antiquity of the place is shown by the fact of its having been known to the Romans under the name of *Lugdunum Batavorum*, and during its whole history it has been an important centre of trade. This ancient importance is explained by the features of the surrounding country. Liége lies, like Namur, Verviers, Huy, and other important towns in the east of Belgium, in a narrow valley of the south-eastern plateau. It lies, however, just where the valley of the Meuse, to which it belongs, begins to open out on the left so as to afford free communication in various directions towards the west and the north, and where also the valley of the Ourthe opens a way to the south through Belgian Luxembourg, and that of the Vesdre, eastwards by way of Verviers and Aix-la-Chapelle to the Rhine. Its position may hence be compared with that of Manchester and Leeds, and all the more nowadays when the mineral wealth of the neighbourhood is so important.

An industrial census of Belgium, taken in October 1896, showed that 690,000 persons were employed at that date in factories, workshops, mines, &c., the male and female employees being in the ratio

of about 5 to 1. In the weaving of cotton and woollen fabrics 46 per cent. of the employees were still engaged on hand-looms, and in linen weaving 61 per cent.; in the hosiery trade less than 6 per cent., and in the boot trade less than 3 per cent., of the employees worked with the aid of power-driven machines. Nearly half the coal-miners worked between 9 and 10 hours a day, and in other industries only one-tenth of the work-people had a working day of less than 10 hours. This relative backwardness in some industries persisted until the outbreak of war, but great improvements were effected during the post-War reconstruction.

The industry and commerce of Belgium are in many respects similar to those of the United Kingdom, and a comparison of the tables given below with those for the United Kingdom is instructive.

For the distribution of the products of its industry, and the reception of products of other countries, few countries on the European mainland have greater natural advantages than Belgium. The flatness of a large part of the country long ago permitted light railways, making use of the roads, to be an important auxiliary in inland transport. On the land side, Belgium lies close to some of the most populous parts of the surrounding countries, and in Antwerp it possesses a seaport vying in situation with that of London.

Like London, Antwerp lies on a tidal river, the Scheldt, at the head of a deep estuary. It stands on the right bank of the river, and is strongly fortified. It has the advantage over London of having a much more extensive and capacious system of inland navigation subsidiary to its transmarine commerce. It is connected by first-class waterways with the Meuse, Seine, and Rhine, this last being reached by the channels between and across the islands of Zeeland. Thus the port has a large share in the transit trade of Belgium. A scheme has for some time been under consideration for constructing a more direct waterway to the Rhine, designed to run first east by Herenthals, then by a more southerly route through Genck in the Campine coal-field (with a branch thence to Liége), and then by München-Gladbach to the Rhine opposite Düsseldorf. Barges of 1,000 tons can reach and ascend the Meuse to Liége. Being the nearest great port to the principal manufacturing region of Germany, it is the chief outlet for that region for goods requiring railway transport, and this fact has greatly contributed to the recent development of the port. In 1887 the tonnage entering the port from the sea was under 4,000,000, in 1913 above 14,000,000, in 1930 nearly 24,000,000. The inland water traffic, however, did not grow at the same rate. In 1887 the tonnage that arrived was somewhat above 2½, in 1913 somewhat above 3½ millions. In former days Antwerp reached the height of its prosperity in the sixteenth century. It afterwards declined from political causes, but since the navigation of the Scheldt was made free in 1863 it has once more

risen to a high rank among continental seaports, and for a time outstripped its Dutch rival, Rotterdam. The port has 28 miles of quayside and a dock water area of 1,334 acres. It is admirably provided with handling apparatus, including floating pneumatic corn elevators, each capable of transhipping 150 tons of corn per hour into lighters. It must, however, remain a permanent disadvantage that the course of the Scheldt below Antwerp lies through Dutch territory and the prosperity of the port thus depends to some extent on the preservation of amicable relationships between Belgium and Holland.

Ghent, at the confluence of the Lys and Scheldt, was made a seaport in the modern sense in 1886 by means of a ship canal from the estuary of the Scheldt at Terneuzen, admitting vessels of 2,500 tons burden (17½ feet draught), and further deepening to nearly 29 feet has made it since 1913 available for much larger ships. Ostend, which lies amongst the downs on the west coast, is the only other Belgian seaport of importance ; but Bruges, one of the older rivals of Antwerp, did not benefit as much as was hoped from the opening, in 1900, of a canal to the sea with a depth of 26 feet 3 inches. Its outport, Zeebrugge, with a large artificial harbour, achieved an unexpected importance during the great War.

As shown in the accompanying tables, since the War a striking feature of the foreign commerce of Belgium has been a great increase in the excess of the value to the imports over that of exports. Down to 1913 inclusive that excess was always under 30 per cent. of the value of the exports, but in 1919 the excess was 128 per cent. and from 1920 to 1923 inclusive was never below 40 per cent. (in 1922 about 50 per cent.). The excess has decreased in the last few years.

TOWNS OF BELGIUM, 1934

Brussels	891,000	Ghent	167,000
Antwerp	278,000	Liége	164,000

BELGIUM [1]

SPECIAL [2] IMPORTS, INCLUDING BULLION AND SPECIE [3] FROM 1905

Average Value in Millions Sterling.

Principal Articles.	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29[5]
1. Grain, all kinds	8·03	11·42	9·96	11·67	12·98	16·12	22·11	27·46	26·13
2. Raw wool	5·21	4·30	2·95	2·64	4·18	5·75	9·46	16·67	12·53
3. Oil-seeds	1·20	1·97	1·88	2·28	2·24	3·30	5·94	2·13	3·36
4. Wood for building	1·67	1·94	2·20	2·58	3·84	4·85	5·67	4·86	5·20
5. Flax and hemp, raw, tow	*2·60*	3·06	2·86	1·78	2·26	5·77	5·36	4·74	3·41[6]
6. Resins, petroleum, &c.	1·71	1·69	2·33	2·83	3·59	4·36	5·29	3·86	4·20
7. Hides, raw	2·96	2·59	2·38	2·17	2·51	3·04	4·80	7·43	5·83
8. Coal and briquettes	—	0·64	0·67	0·92	1·75	2·42	3·98	7·10	12·04
9. Raw cotton	1·84	1·36	1·04	1·15	1·32	2·12	3·15	7·69	8·35
10. Iron ore and pig-iron	1·29	1·07	1·25	1·14	1·97	1·89	3·07	2·22[4]	8·03
11. Dyes and dye stuffs	0·42	0·55	0·59	0·82	1·27	1·80	2·87	2·69	4·67
12. Coffee	1·87	1·43	1·74	2·20	1·84	1·70	2·81	3·24	6·19
13. Machinery	—	—	0·46	0·66	1·31	1·81	2·71	3·81	8·47
Animals, excluding horses	1·67	2·24	1·87	1·14	1·03	1·15	1·30	1·55	—
Diamonds, from 1897	—	—	—	—	2·15	2·68	3·21	4·03	8·60[7]
Average total value	32·62	60·50	60·24	65·33	81·36	104·87	148·19	193·55	193·06

Percentages of Total Value.

Principal Articles.	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Grain, all kinds	15·2	18·8	16·5	17·9	16·0	15·4	14·9	14·2	13·5
2. Raw wool	9·9	7·1	4·9	4·0	5·1	5·5	6·4	8·6	6·5
3. Oil-seeds	2·3	3·2	3·1	3·5	2·8	3·1	4·0	1·1	1·7
4. Wood for building	3·2	3·2	3·7	3·9	4·7	4·6	3·8	2·5	2·7
5. Flax and hemp, raw, tow	*4·9*	5·1	4·7	2·7	2·8	5·5	3·6	2·4	1·8
6. Resins, petroleum, &c.	3·2	2·8	3·9	4·3	4·4	4·2	3·6	2·0	2·2
7. Hides, raw	5·6	4·3	4·0	3·3	3·1	2·9	3·2	3·8	3·0
8. Coal and briquettes	—	1·1	1·1	1·4	2·1	2·3	2·7	3·7	6·2
9. Raw cotton	3·5	2·2	1·7	1·8	1·6	2·0	2·1	4·0	4·3
10. Iron ore and pig-iron	2·5	1·8	2·1	1·7	2·4	1·9	2·1	1·1	4·2
11. Dyes and dye stuffs	0·8	0·9	1·0	1·3	1·6	1·7	1·9	1·4	2·4
12. Coffee	3·5	2·3	2·9	3·4	2·3	1·6	1·9	1·7	3·2
13. Machinery	—	—	0·8	1·0	1·6	1·7	1·8	2·0	4·4
Animals, excluding horses	3·2	3·7	3·1	1·7	1·3	1·1	0·9	0·8	—
Diamonds, from 1897	—	—	—	—	2·6	2·6	2·2	2·1	4·5

SPECIAL [1] EXPORTS, INCLUDING BULLION AND SPECIE FROM 1905

Average Value in Millions Sterling.

Principal Articles.	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29
1. Iron and steel, and manufs.	—	—	—	—	—	6·75	8·79	12·04	25·60
Iron and steel	—	—	3·27	3·64	5·46	6·53	—	1·45	5·36
Iron rails, sheet, &c.	*2·03*	*1·65*	*1·60*	*1·43*	*2·05*	*2·26*	—	*7·72*	—
2. Machinery and locomotives	*1·66*	2·42	2·99	3·24	3·78	3·87	7·76	7·28	7·18
3. Grain	1·84	4·22	2·77	3·75	3·30	3·63	6·21	7·31	—
4. Coal, coke, and briquettes	4·14	3·17	3·39	3·91	4·69	4·66	4·62	5·17	6·32
5. Raw flax	3·29	2·62	2·33	1·80	1·97	3·25	4·06	5·00	3·33
6. Yarn, linen, hemp, and jute	1·56	2·59	3·00	2·30	2·71	3·34	3·56	4·65	2·56[8]
7. Zinc, unwrought	0·86	1·37	1·17	1·38	1·91	2·41	3·43	4·17	3·07
8. Glass and glassware	1·12	2·09	1·92	1·92	3·20	3·43	3·38	3·91	6·63
9. Raw hides	2·06	1·89	1·91	1·64	1·95	2·34	3·34	4·68	2·01
10. Cottons	—	—	0·82	0·93	1·03	1·55	2·51	3·63	9·13
,,	0·70	0·84	0·80	—	—	—	—	—	—
11. Wool yarn	2·23	2·17	2·27	2·05	1·64	1·64	1·99	2·38	4·13
12. Sugar, raw	1·61	1·26	1·42	1·51	1·03	0·80	0·80	} 2·05	{ —
,, refined	—	0·28	0·37	0·61	0·77	0·60	0·99		2·81
13. Diamonds, from 1897	—	—	—	—	2·35	2·95	3·27	2·70	11·76
Average total value	42·52	52·07	52·49	55·47	70·03	83·05	114·92	149.94	162·43

Percentages of Total Value.

Principal Articles.	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Iron and steel, and manufs.	—	—	—	—	—	8·1	7·6	8·0	15·2
Iron and steel	—	—	6·2	6·6	7·8	7·9	—	1·0	3·2
Iron rails, sheet, &c.	*4·7*	*3·1*	*3·0*	*2·6*	*2·9*	2·7	—	*5·1*	—
2. Machinery and locomotives	3·9	4·6	5·7	5·8	5·4	4·7	6·8	5·5	4·3
3. Grain	4·3	8·1	5·3	6·8	4·7	4·4	5·4	4·9	—
4. Coal, coke, and briquettes	9·7	6·1	6·5	7·1	6·7	5·6	4·0	3·4	3·8
5. Raw flax	7·7	5·0	4·4	3·3	2·8	3·9	3·5	3·3	2·0
6. Yarn, linen, hemp, and jute	3·6	4·9	5·7	4·2	3·9	4·0	3·1	3·1	1·5
7. Zinc, unwrought	2·0	2·6	2·2	2·5	2·7	2·9	3·0	2·8	1·8
8. Glass and glassware	2·6	4·0	3·7	3·5	4·6	4·1	2·9	2·7	3·9
9. Raw hides	4·8	3·6	3·6	3·0	2·8	2·8	2·9	3·1	1·2
10. Cottons	—	—	1·6	1·7	1·5	1·9	2·2	2·4	5·4
,,	1·6	1·6	1·5	—	—	—	—	—	—
11. Wool yarn	5·2	4·1	4·3	3·7	2·3	2·0	1·7	1·6	2·5
12. Sugar, raw	{ 3·7	2·4	2·7	2·7	2·3	1·2	0·7	{ 1·4	{ —
,, refined	—	0·5	0·7	1·1	1·1	0·7	0·9		1·7
13. Diamonds, from 1897	—	—	—	—	3·2	3·4	2·8	1·8	7·0

BELGIUM

COUNTRIES OF ORIGIN AND DESTINATION

From	Percentages of Total Value. '71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. France	21·0	19·8	19·4	18·2	16·6	16·3	16·6	18·2	20·5
2. Germany	12·9	14·1	11·2	11·2	12·8	13·2	13·2	14·2	11·1
3. United Kingdom	17·9	13·1	12·7	11·6	13·5	12·1	12·3	10·1	11·7
4. United States	7·6	11·2	9·6	9·8	12·3	10·2	7·9	8·1	10·8
5. Netherlands	13·0	14·2	13·6	11·3	8·5	8·6	7·7	7·0	10·9
6. Argentina	4·7	3·2	4·2	5·2	5·1	6·3	7·5	6·2	7·1
7. Russia	5·7	8·0	7·2	6·2	7·0	7·2	7·2	5·9	0·8
8. Roumania	—	1·4	4·9	5·0	4·1	4·6	4·3	4·0	0·1
9. BritishEastIndia	—	4·4	4·2	4·7	3·1	4·0	3·9	5·2	3·2
10. Australasia	—	0·4	0·5	1·1	1·9	2·0	3·3	3·8	2·3
11. Congo	—	—	0·1	0·7	1·3	1·9	1·8	1·2	2·0
12. Chile	—	—	—	1·1	1·4	1·1	1·5	1·6	1·0

To	Percentages of Total Value. '71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
Germany	21·2	17·8	17·1	22·1	23·5	22·9	25·3	25·9	13·1
France	31·7	30·8	26·2	22·6	19·3	17·5	18·9	19·6	15·1
United Kingdom	29·8	19·7	19·8	17·9	18·5	17·6	11·3	11·6	19·1
Netherlands	12·5	13·2	11·3	11·1	11·3	11·1	10·1	9·3	11·8
United States	1·1	3·1	3·6	3·6	3·5	1·2	3·1	3·3	9·0
Argentina	0·6	0·9	1·7	1·0	1·1	1·4	2·9	2·1	3·0
Italy	1·1	2·3	2·7	1·8	1·8	1·8	2·5	2·0	2·1
Russia	1·3	0·7	0·6	1·1	2·2	1·5	1·5	2·1	
Brazil	0·8	1·1	1·1	1·1	1·0	1·0	1·4	1·9	1·6
Switzerland	1·3	2·1	2·2	2·2	1·9	1·3	1·4	1·1	2·2
China	-	0·6	0·5	0·6	0·7	1·3	1·3	1·2	1·0
Spain	0·8	2·1	1·9	1·8	1·7	2·3	1·3	1·2	0·9

[1] In pre-war years 'declared values' in case of most duty-free goods, 'official values' revised annually for others. In post-war years 'declared values' only.

[2] A large quantity of duty-free goods are entered for home consumption although really in transit. Such goods when leaving the country are included in the statistics of exports of domestic produce.

[3] Bullion and specie have been included in totals from 1905 (1906–10 imports £4·70 [3·2 per cent.], exports £2·20 [1·9 per cent.]); diamonds from 1897.

[4] Iron ore only. [5] Rate of exchange for 1925, 99·8 frs.; 1926, 107·0 frs.; 1927, 1928, 1929, 175 fr. = £1 sterling. [6] Flax. [7] Precious stones. [8] Linen.

BELGIUM

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*22·7*	*22·2*		
Wheat	7·6	6·7	4·4		
Maize	2·4	2·6	2·3		
Other cereals	2·6	2·4	2·4		
Coffee	1·8	1·8	1·7		
Raw Materials	—	*51·0*	*47·1*		
Coal, coke, &c.	5·7	6·7	5·9		
Wool	7·3	6·4	5·4		
Precious stones	2·6 [1]	4·1	3·3		
Hides and skins (raw)	2·6	3·5	2·1		
Cotton	4·8	3·4	2·9		
Sawn timber	2·2	2·8	2·7		
Oil-cake and seed	1·7	2·5	2·6		
Iron ores	1·2	1·7	2·1		
Other ores	2·0	2·7	2·5		
Mineral oils	2·0	2·4	3·0		
Manures	1·0	1·7	2·1		
Manufactures	—	*25·6*	*28·4*		
Textiles	—	6·2	5·3		
Machy., electrical appar.	3·1	5·5	6·0		
Metal manufactures	—	3·6	3·4		
Chemicals, dyes and drugs	0·8 [2]	2·4	3·2		
Paper and manufactures	—	2·1	2·6		
Vehicles and parts	2·7	1·9	2·5		
Total value in 1,000 million francs	*17·57*	*30·10*	*17·11*		
Countries:					
France	21·8	19·9	16·6		
Germany	9·2	12·9	15·3		
Netherlands	10·2	11·4	12·0		
United Kingdom	13·6	10·9	8·3		
United States	11·1	10·3	8·0		
Argentina	8·3	6·8	6·3		
Belgian Congo	0·8	2·6	5·0		
India	2·9	2·7	2·2		
Australia	2·5	2·1	2·2		
U.S.S.R.	0·3	1·0	2·6		

[1] Diamonds only. [2] Dyes and colours only.

Rate of exchange for 1924 to 1929 see preceding table; 1930 and to September 21, 1931, 175 francs 35 belgas) = £1; 1932–35 about 110 francs.

BELGIUM

SPECIAL EXPORTS

	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*8·2*	*7·4*		
Raw materials	—	*33·2*	*37·7*		
Precious stones	3·9 [2]	6·4	5·7		
Coal	2·4	2·6	4·1		
Other minerals	—	3·1	4·1		
Wool	4·5	4·1	4·9		
Flax	2·1	2·0	1·8		
Other vegetable products	—	4·3	5·6		
Copper (crude)		—	2·5 [1]		
Iron and steel (crude)	7·5	2·7	2·1		
Other metals (crude)		3·3	2·7		
Manures, chemicals, dyes	2·6	4·4	7·1		
Iron and steel	13·9	13·1	14·7		
Manufactures	—	*57·8*	*52·9*		
Other metal manufrs.	—	5·0	4·8		
Cotton manufs. (excl. yarn)	4·4	5·5	4·9		
Other textiles (incl. yarn)	—	10·7	7·6		
Machy., electrical appar.	2·0	4·5	3·9		
Glass	4·0	3·7	2·9		
Paper and manufactures	—	1·7	2·1		
Vehicles	—	1·9	1·8		
Total value in 1,000 million francs	*13·88*	*27·14*	*21·71*		
Countries:					
France	16·2	13·4	18·7		
United Kingdom	20·9	14·3	15·7		
Netherlands	12·2	12·1	12·2		
Germany	11·4	12·4	10·5		
United States	7·9	8·1	5·6		
Switzerland	2·6	2·3	3·4		
Argentina	3·0	2·9	2·6		
Italy	2·0	2·3	2·4		
India	2·4	2·4	2·2		
Belgian Congo	1·4	2·2	1·2		

[1] For years 1933–35 only, not differentiated earlier. [2] Diamonds only.

For Towns of Belgium, see page 385.

HOLLAND, OR THE NETHERLANDS[1]

The kingdom of the Netherlands proper, that is, the state that lies to the north of Belgium, is an industrial, agricultural, and commercial country. It has no highland region, and little of the mineral wealth that characterises the highland region of Belgium, though it may be mentioned that the Campine coal-field extends into Holland as the Limburg coal-field. In the eastern provinces of Drenthe, Overijssel, and Gelderland, a large part of the surface is sandy heathland, which considerably reduces the area available for crops and pasture. The whole extent of land capable of being so utilised is little more than 70 per cent. of the entire area; but, on the other hand, a large part of the agricultural region is of very exceptional fertility. This is especially the case with those parts, chiefly in the provinces of Zeeland and Holland proper, which lie below the level of the sea and have been regained from the sea by centuries of labour. From the nature of the case these tracts can have no natural drainage, and there are other extensive areas which, though above sea-level, yet lie so low that they cannot be drained by ordinary means. Hence **polders**—that is, enclosures surrounded by dykes or embankments and provided with pumping-machinery—form the characteristic scenery of the most populous parts of the country. Only some of the higher polders have semi-natural drainage into canals. The soil of such areas is naturally moist, and thus best fitted for rich pasture grasses, so that horses and cattle are very numerous, and the cattle yield abundance of milk. Hence it is that butter takes so high a place among the special exports of Holland, and that cheese also is an important Dutch commodity. The western provinces above mentioned, and the southern (notably Noord-Brabant) together with Friesland in the North, are those which are most noted under this head.

The other crops of Holland are similar to those of Belgium, sugar-beet being among the number. A culture of special interest in the light soils around Haarlem is that of flowers and bulbs, the latter being sold in vast quantities to the amateur gardeners of many European countries. Schemes for extending the agricultural area of Holland by the drainage of the Zuider Zee or part of it were again and again proposed. The Dutch government at last embarked upon a gigantic scheme which, when complete, will add four tracts totalling over 800 square miles to the area of

[1] Revised with the help of Dr. B. G. L. M. Tosseram of the Vereeniging "Nederland in den Vreemde."

Holland. There will remain in the centre a lake (Yssel Lake) covering nearly 600 square miles. The first area to be reclaimed lies to the south of the island of Wieringen, and the area was drained and put under cultivation in 1931 and the lake cut off by a dam in the same year.

In **manufacturing industry** Holland long had a high reputation. The dearth of minerals, especially of coal, however, was adverse to the carrying on of manufactures by machinery after the Industrial Revolution. In the present century, however, a continuation of the Belgian Campine coal-field was found to pass under the south of the province of Limburg, in the extreme south-east of the country, near enough to the surface to afford seams of workable coal, and there is a growing production of coal from private and state mines. The output in 1912 was 1,700,000 tons; in 1922, 4,600,000 tons; in 1925, 6,850,000 tons; in 1929, 11,400,000 tons, and by 1935 had increased to over 13,000,000 tons. The export is now almost as large as the import (from Germany and Great Britain). Manufacturing has now become the leading occupation in Holland, employing nearly 40 per cent. of the occupied population. Cotton, linen, and woollen industries have long been pursued. Certain of the cotton and linen manufacturing towns in the country, Enschede, Almelo, Hengelo, &c., are situated in the province of Overijssel, where the cotton industry was established in a thinly peopled district before the close of the eighteenth century, and in modern times has profited by the large market of the Dutch East Indies. Tilburg is the seat of the Dutch woollen industry, Eindhoven of the specialized linen industry (famed for artistic damasks). The latter town is the seat of the great radio and electric lamp factories of Philips. Utrecht is famed for its engineering and chemical works. The rayon industry has been established at Ede, Arnhem and Breda. Delft still retains the manufactures of earthenware for which it has long been famous. An iron industry using imported iron has been set on foot, and early in 1924 a large up-to-date blast-furnace plant was started at Ijmuiden, and shipbuilding with German plates has been carried on at the mouths of the Rhine and Meuse.

In **foreign commerce** Holland has stood in the front rank of nations from the very beginning of its separate existence, and among the facilities for foreign commerce the waterways, natural and artificial, have greater importance in Holland than in any other European country. In 1900 the length of river and canal navigation was nearly twice as great as the length of railways.

It may be convenient to consider here the commercial development more particularly of the maritime provinces both of the modern Belgium and the kingdom of the Netherlands, inasmuch as the same geographical conditions have in a large measure affected those of both countries. The waterways of the Rhine, the Meuse,

and the Scheldt have at all times given to the ships of these provinces access to the interior of important parts of the continent. Most important was the Rhine with the Rhine valley which, where the river itself in past times was not navigable, has been used as a highway into the interior of Europe from prehistoric times downwards. The towns that first rose to high commercial importance in this region were the Flemish ports of Bruges and Ghent. For this there seem to have been from the first two chief reasons. First, the northern ports more directly connected with the Rhine lay in a district where much reclamation of land had to be done before a large population could grow up. Second, the ports just named were nearer the centres of influence of the old Roman civilisation, which still survived and continued to be propagated in spite of the convulsions by which the empire had been overthrown. Arras, now in the French Department of Pas-de-Calais, was the focus of civilisation for the whole of northern Flanders. That the navigation of the Rhine was of importance to the Flemish towns at an early date is shown by a record of the year 1178, in which reference is made to an already long-existing right of commerce on that river even above Cologne enjoyed by the people of Ghent. At an early date also the proximity of the Flemish ports to England was a matter of great importance, and particularly during the period when so much English wool was wrought up in Flemish towns (thirteenth to the fifteenth century). During this period Bruges had the advantage of possessing a great harbour at the head of the Zwin channel, which then ran due north to the estuary of the Scheldt. With the same harbour Ghent was connected by canal (after the middle of the thirteenth century) at an even earlier date than the connection with Terneuzen was established (first after 1329). Antwerp rose into importance later than Bruges and Ghent. Physical changes first established its communication with the sea by way of the West Scheldt in the latter part of the thirteenth century, and it profited greatly by the silting up of the Zwin, which deprived Bruges of its harbour in the course of the fifteenth century. Of the towns in Holland, Leiden and Dordrecht were among the first to rise into prominence through the Rhine traffic, but the progress of Dordrecht was arrested by a great flood which in 1421 overwhelmed the adjoining district. After the discovery of the sea-way to India in 1497–99, a great accession of wealth came to the ports of the Low Countries through the commerce carried on by them in Eastern products. These were brought by the Portuguese to Lisbon, but Lisbon is not situated, like Venice and Genoa, in such a position that they could be distributed thence into the heart of Europe. From the Italian ports, after being carried across the Alps, they were conveyed by the Rhine and Elbe down stream. After the sea-route to India had been opened up, they were carried into the heart

of Europe by the Rhine and Elbe up stream. A sudden increase of prosperity was brought to the Dutch towns owing to the circumstances in which the northern provinces of the Netherlands became a separate political community. In 1579 the seven northern provinces proclaimed their independence of Philip II. of Spain, to whom at that time all the Netherlands belonged. The cause of the revolt was the attempt of Philip to put down the Reformation throughout his dominions. In the Seven Provinces, however, freedom of conscience was proclaimed, and that caused a rapid immigration into Dutch towns of Protestants and Jews, many of whom brought with them the manufacturing skill that had already been raised to a high pitch in Flanders and Brabant, Liége and Namur. Before the close of the sixteenth century the Dutch had made their first voyage direct to the East. In 1602 the Dutch East India Company was founded, and within forty years after that the Portuguese acknowledged with bitterness that almost the entire trade with the distant East had passed out of their hands into those of the Dutch. The commercial predominance of the Dutch in the Malay Archipelago has lasted down to the present day, although their trade generally, including their Eastern trade, has been eclipsed by the development of the greater resources of Great Britain.

The seaports of Holland have not as great natural advantages as their Belgian rival Antwerp, but no pains nor expense have been spared to enable the two chief ports, Amsterdam and Rotterdam, to meet the requirements of modern commerce. Amsterdam, on the Ij, near its old mouth in the shallow Zuider Zee, was formerly difficult of access for large ships. Communication with the sea was first facilitated by the construction of the North Holland Canal to Helder at the entrance to the Zuider Zee; but as ships became larger this proved inadequate, and finally a direct communication with the sea was made by means of the North Sea Canal, which is over 40 feet in depth, and brings Amsterdam to within a distance of fifteen miles from the harbour of Ijmuiden. This canal was completed in 1876, and the shipping of Amsterdam in consequence increased very rapidly. The internal communications of this port were greatly improved in 1892 by the opening of the Merwede Canal (10¼ feet deep), running southwards to Vreeswijk on the Lek and Gorinchem (Gorkum) on the Waal. By this means vessels of considerable size are enabled to reach the Rhine.

Rotterdam, on the Nieuwe Maas, is a port liable to be obstructed by the copious deposits of sediment brought down by those streams. The entrance from the sea to the river on which it stands is too shallow to be entered by large vessels, and the first route to the sea constructed for them was a canal through the island of Voorne, entering the Haringvliet at Hellevoetsluis. Later this was superseded by the 'New Waterway,' which enters the sea to the north of

the mouth of the Maas. Opened in 1872, this route was at first too shallow to allow large vessels to ascend without discharging part of their cargo, but it has since steadily been deepened, and improvements are constantly being made. Dredging is constantly being carried on, and the navigable channel has been increased to a width of about 330 feet with a low-water depth of 32·3 feet and a high-water depth of 38·6 feet. A floating dock 600 feet long by 160 feet wide with a capacity of 50,000 tons was installed in 1920. The merchant tonnage that entered the port in 1929 was nearly 49,300,000. The development of subsidiary ports along the New Waterway should be noted. The port, which includes Delfshaven, is the natural port of the Rhine and the Rhine valley, and has greatly benefited by the improvements in the navigation of the Rhine above the Dutch frontier, which make it pre-eminently the port of the Rhine basin for bulky cargoes such as grain, oil, and petroleum. In the import of grain Rotterdam has come to excel Antwerp; the natural advantages of access to the Rhine having been reinforced by the provision at the port of large floating elevators. None of the leading ports of Europe showed so great an increase in the amount of its shipping at the end of the nineteenth century. In the last decade of that century the shipping that entered the port increased by upwards of 100 per cent. Rotterdam has a large trade in raw cotton and sugar, and ranks next to London as a market for tea. The Hook of Holland (*Hoek van Holland*) has been since 1892 an important place of passenger traffic with Harwich. The minor ports of Holland are Schiedam, Harlingen, Dordrecht, Groningen, and Flushing (Vlissingen). Formerly cut off from the mainland by the channels between the islands of Walcheren and S. Beveland, and between this latter island and the province of N. Brabant, Flushing has, since the construction of the railway connecting it with the interior, become a rival of Ostend for postal and express traffic of high value in proportion to its bulk with the northern parts of central Europe.

The only towns in the Netherlands with more than 100,000 inhabitants which are not seaports are The Hague and Utrecht. The Hague (in Dutch *'s Gravenhage* or *Den Haag*) is the seat of the court and of the Dutch legislature as well as of the International Court, although Amsterdam is regarded as the commercial capital of the country. It is rapidly increasing in population, but mainly in consequence of its attractions as a residential city. Arnhem, situated where the Lower Rhine changes its course from a north-westerly to a westerly one, a situation in itself likely to bring about a convergence of traffic, is the principal inland centre of trade, bringing especially the poorer north-eastern provinces of the kingdom into communication with the richer maritime provinces and with the sea. Alkmaar is famed for its cheese market.

NETHERLANDS

Table showing the quantity of certain Dutch Imports and Exports, 1908, and their value calculated on the bases of British prices and Dutch returns respectively.
Radical changes were introduced on Jan. 1, 1917, and declared values are now used.

Imports. Commodities.	Quantity.	Value based on British Prices.	Value according to Dutch Returns (12G = £1)	Declared values (11·50G = £1)	Percentage of Special Trade.
	1908.	1908.	1908.	1924.	1924.
	Mln. Kilog.	Mln. £.	Mln. £.	Mln. £	
1. Coffee, raw	119·1	6·53	4·37	6·21	3·0
2. Copper, unwrought	102·2	6·07	8·52	—	—
3. Cotton, raw	52·7	3·15	2·64	3·49	1·7
4. Grain, wheat	1,093·0	9·07	11·84	7·37	3·6
5. „ maize	611·7	3·85	3·48	7·62	3·7
6. Indigo	1·4	0·42	0·72	—	—
7. Oleo-margarine	32·7	1·58	1·22	14·52	7·2
8. Sugar, raw	55·0	0·58	1·60	—	—
9. Tin, unwrought	18·5	2·42	1·54	—	—
10. Peruvian bark (cinchona)	7·6	0·28	—	0·83	0·4

Exports. Commodities.	Quantity.	Value based on British Prices.	Value according to Dutch Returns (12G = £1)	Declared values (11·50G = £1).	Percentage of Special Trade.
	1908.	1908.	1908.	1924.	1924.
	Mln. Kilog.	Mln. £.	Mln. £.	Mln. £.	
1. Cheese	53·6	4·56	1·57	6·44	4·5
2. Peruvian bark (cinchona)	4·7	0·20	15·76	0·52	0·4
3. Flax, raw	43·5	3·01	2·54	—	—
4. Margarine	42·4	2·13	2·83	5·32	3·7
5. Butter	33·1	3·72	2·76	6·08	4·2
6. Paper and manufactures.	150·3	3·56	5·47	3·08	2·1
7. Sugar, refined and candy	106·6	1·52	3·57	7·17	5·0
8. Tin, unwrought	15·6	2·04	1·30	—	—

Towns of Holland, 1935

Amsterdam	782,000	Haarlem	129,000
Rotterdam	598,000	Groningen	113,000
The Hague	477,000	Eindhoven	100,000
Utrecht	161,000		

NETHERLANDS

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*23·3*	*14·6*		
Maize	3·7	3·9	3·4		
Wheat	3·6	3·0	2·4		
Other cereals . . .	6·7	4·9	3·7		
Coffee	3·0	2·0	2·7		
Raw materials . . .	—	*33·6*	*26·2*		
Timber	3·5	6·2	5·8		
Coal, coke, and briquettes	5·4	5·0	4·6		
Oil-seeds.	3·2	3·8	3·9		
Mineral oils . . .	2·3	2·6	3·1		
Artificial manures . .	2·1	2·5	2·1		
Cotton : raw and waste .	1·7	1·9	1·6		
Manufactures . . .	—	*38·8*	*35·4*		
Machinery and apparatus .	3·5	5·7	6·7		
Iron and steel and manufs.	4·5	5·7	6·0		
Textile piece goods . .	5·5	5·0	5·4		
Yarns	4·0	3·1	2·9		
Apparel and dressed furs .	2·3	2·7	3·5		
Vehicles	2·1	2·3	2·9		
Total value in million gulden . . .	*2·36*	*2·57*	*1·28*		
Countries:					
Germany	24·3	28·3	29·8		
Belgium	10·6	10·6	10·5		
United Kingdom . .	13·4	9·9	9·1		
United States . . .	11·4	10·0	6·9		
Argentina . . .	6·3	6·6	6·7		
Dutch East Indies . .	5·7	4·9	4·9		
France	4·2	4·5	4·3		
U.S.S.R.	1·9	1·4	2·9		

Rate of exchange: par rate, prior to September 21, 1931, 12·107 florins or gulden to £1; 1932–35 approximately 7 florins.

NETHERLANDS

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*43·9*	*24·4*		
Cheese	4·5	4·0	3·9		
Eggs, and products of	—	3·2	3·6		
Milk and cream	3·5	2·8	3·7		
Fresh vegetables	2·7	3·0	3·5		
Vegetable oils	5·4	5·7	3·4		
Flour, and products of	4·2	2·8	3·0		
Butter	4·2	4·3	3·0		
Salted meats	—	2·7	3·0		
Fresh ,,	4·4	2·2	1·0		
Margarine and butter substitute	3·7	2·7	0·7		
Refined sugar and molasses	5·0	2·0	0·5		
Raw materials	—	*19·4*	*15·2*		
Coal, coke, and briquettes	3·3	4·9	6·4		
Flowers, bulbs, &c.	2·3	2·8	3·5		
Artificial manures	—	1·3	2·9		
Manufactures	—	*34·0*	*27·6*		
Machinery and apparatus	2·0	4·5	7·6		
Textile manufactures	6·8	8·1	4·3		
Yarns	—	2·3	2·6		
Iron and steel and manufs.	2·0	2·3	2·4		
Paper ,, ,,	2·1	2·2	2·3		
Total value in million gulden	*1·66*	*1·87*	*0·86*		
Countries:					
Germany	27·5	22·6	21·3		
United Kingdom	23·7	23·4	20·2		
Belgium	8·4	9·1	12·5		
France	6·2	6·3	8·8		
Dutch East Indies	5·9	8·1	5·1		
United States	8·3	3·9	3·7		

For Towns of Holland, see page 395.

GRAND-DUCHY OF LUXEMBOURG

This is a small independent State, about 1,000 square miles in extent, wedged in between Belgium, Rhenish Prussia, and France. The Grand-Duchy belongs, since May 1, 1922, to the Belgian Customs Union. It was at first intended to be included after the War in the French Customs Union, but the magnates of the French iron and steel industry, dreading the competition of the cheaper labour of Luxembourg, protested against this proposal so strongly that the union with Belgium was ultimately adopted. It mainly consists of high ground deeply furrowed by narrow valleys. Small as it is, it has a high degree of economic importance, from the fact that it has in the south very productive deposits of iron ore, immediately adjoining similar deposits in France. Much is exported beyond the customs frontier, but more than half is smelted locally. In 1929 the production of pig-iron was 2·9 million tons (metric) and of steel 2·7 million tons. Even in the depression year of 1935 the production of pig-iron was 1·87 million tons and of steel 1·84 million. Rather more than one-third of the 260,000 inhabitants are engaged in agriculture, the principal crops being oats and potatoes.

GERMANY [1]

The German Empire had before the War an area 70 per cent. greater than that of the British Isles, with a population about 36 per cent. more numerous. The population was thus less dense than that of the British Isles, but it was increasing more rapidly.

As a commercial unit the German Empire, to which all the pre-War data in the tables below refer, included the Grand-Duchy of Luxembourg in addition to the whole territory of the Empire, with a few trifling exceptions. As the formation of this Customs Union was of the greatest consequence for the industrial and commercial development of Germany, the various steps by which it was brought about are worthy of being placed on record. The first important step towards the diminution in the number of customs barriers within the territory of the German Empire was the abolition of all internal customs dues within the kingdom of Prussia, as it then was, by the law of May 26, 1818, which came into operation on January 1, 1819. At that time it is said that no fewer than sixty different customs and excise tariffs were in force in Prussia alone. A movement was then set going towards a union among different German states. To this movement Prussia was averse, and the conferences held between representatives of a number of south German states were at first fruitless. At last a union was effected between Bavaria and Württemberg on January 18, 1828. In the month following a separate union was established between Prussia and the Grand-Duchy of Hesse (Hesse-Darmstadt). The northern and southern unions then made approaches to each other, and in May 1829 a treaty was concluded between them according to which the two unions agreed to bring their fiscal systems more and more into harmony with each other. Four years later it was agreed that on January 1, 1834, the two unions should merge in one, and before that date Saxony and the Thuringian States agreed to become members of this union also. This date accordingly marks the beginning of the first comprehensive union, but it is important to note that the two great divisions of the kingdom of Prussia, as it then was, were still severed by the kingdom of Hanover, which

[1] In the revision of this section much assistance has been received from Dr. Hilda Ormsby.

remained aloof. In 1835 the Union was joined by Baden, in 1836 by Nassau, Frankfurt-on-Main, and some other small States, but not till 1851, when Hanover joined, did the Union embrace a continuous territory throughout the north German plan. In 1852 Oldenburg and Schaumburg-Lippe added their territories to the Union. In 1865, when the Duchy of Lauenburg was annexed to the kingdom of Prussia, and in 1866, when those of Schleswig and Holstein were annexed to the same kingdom, these duchies also became included in the Union, and, after the dissolution of the North German Confederation, the Grand-Duchy of Luxembourg, which had been a member both of the Confederation and the Customs Union, while made politically by the treaty of London an independent neutral territory, continued to be included in the Customs Union. In 1868 the Union was further extended by the accession of the Mecklenburgs and Lübeck, and the Customs Union was completed within pre-War limits by the inclusion of Hamburg and Bremen, with the exception of the parts reserved as free-ports, in October 1888. Finally, the Customs Union (Zollverein) was enlarged into the Economic Union (Wirtschaftgebeit) by the inclusion of all free-ports on March 1, 1906. The German Republic, which succeeded the Empire by the revolution of November 9, 1918, and for which a constitution was adopted on August 11, 1919, retains the official designation of *Das Deutsche Reich.*

Surface and Communications. The great plain which makes up north and the greater part of east Germany is for the most part of but slight fertility, and endowed with little mineral wealth. It is thus on the whole a region of low density of population. The greater part of it is not relatively more populous than the south and west of Ireland, the more densely peopled areas within it being chiefly those on the lower parts of the Elbe, Oder, and Vistula, and on the area (including Berlin) between the Elbe and Oder where these two rivers approach one another between lat. 52° and 53°.

The remainder of the reich consists mainly of hilly country and tablelands, and has for the most part a density of population as high as that of the south-east of England, with a few smaller tracts in which the density reaches or approaches that of the English and Scotch manufacturing districts. This higher density is due partly to the more fertile soil and more favourable climate of the sheltered valleys, partly to mineral wealth and manufacturing industry. In the south-east of the western half of the country, a region occupying fully the half of Bavaria, and composed in large part of a bleak tableland with a poor soil, and without mineral wealth, has as sparse a population as the greater part of the plain. The height of this tableland is about 1,000 feet lower than that of France (Munich, 1,700 feet).

In the highland regions of western Germany the importance

of the Rhine valley as an avenue for communication north and south is strikingly illustrated by the fact that two double lines of railway, one on either bank of the river, ascend the entire gorge from Cologne to the base of the Taunus, and there are several parallel lines higher up. On the south German frontier the Erzgebirge present a serious barrier to communication, on account of the fact that they lie between the most densely peopled parts of the Czech plateau (Bohemia) and Saxony, where there is an interval of about forty miles or more uncrossed by rail. The Bohemian Forest, on the south-west of the province from which it takes its name, has an interval of more than fifty miles uncrossed by rail between the break in the chain at Furth and the gap in the north at Eger—the gap which separates the Bohemian Forest from the western end of the Erzgebirge, and towards which several railways converge. There is another railway crossing-place in the Bohemian Forest just to the south of the culminating peak, Mt. Arber, but between this and the Danube (about forty-five miles) there is no other railway from west to east. The Bohemian Forest, however, separates the less densely peopled parts of Bavaria and Bohemia. The Sudetes have an interval of about fifty miles uncrossed by railway, between thickly peopled parts of Silesia on the one side, and Bohemia and Moravia on the other, and at their south-eastern extremity several railways converge to the relative depression known as the Moravian Gate between the Sudetes and the Carpathians.

Of the six great railway routes which cross the Alps beyond the frontiers of Germany, three, two in Switzerland and one in Tirol, are of the highest importance to German commerce. For the commerce of Germany that of St. Gotthard is the most important, leading as it does directly from the most populous parts in the west of the realm, through the most populous parts of Switzerland, to the most populous parts of northern Italy. Next in importance is that by way of the Brenner (the valleys of the Inn and Adige), which is the direct route between the most populous parts of Middle Germany (including Berlin) and the eastern part of the north Italian plain. The Simplon tunnel, supplemented by the Lötschberg tunnel, adds another route between Italy and south-western Germany. The railway across the Semmering Pass (in the east of the Niedere Tauern) by way of Vienna and the Sudetes, or by way of the Moravian Gate, connects the port of Trieste with the south-east of Germany.

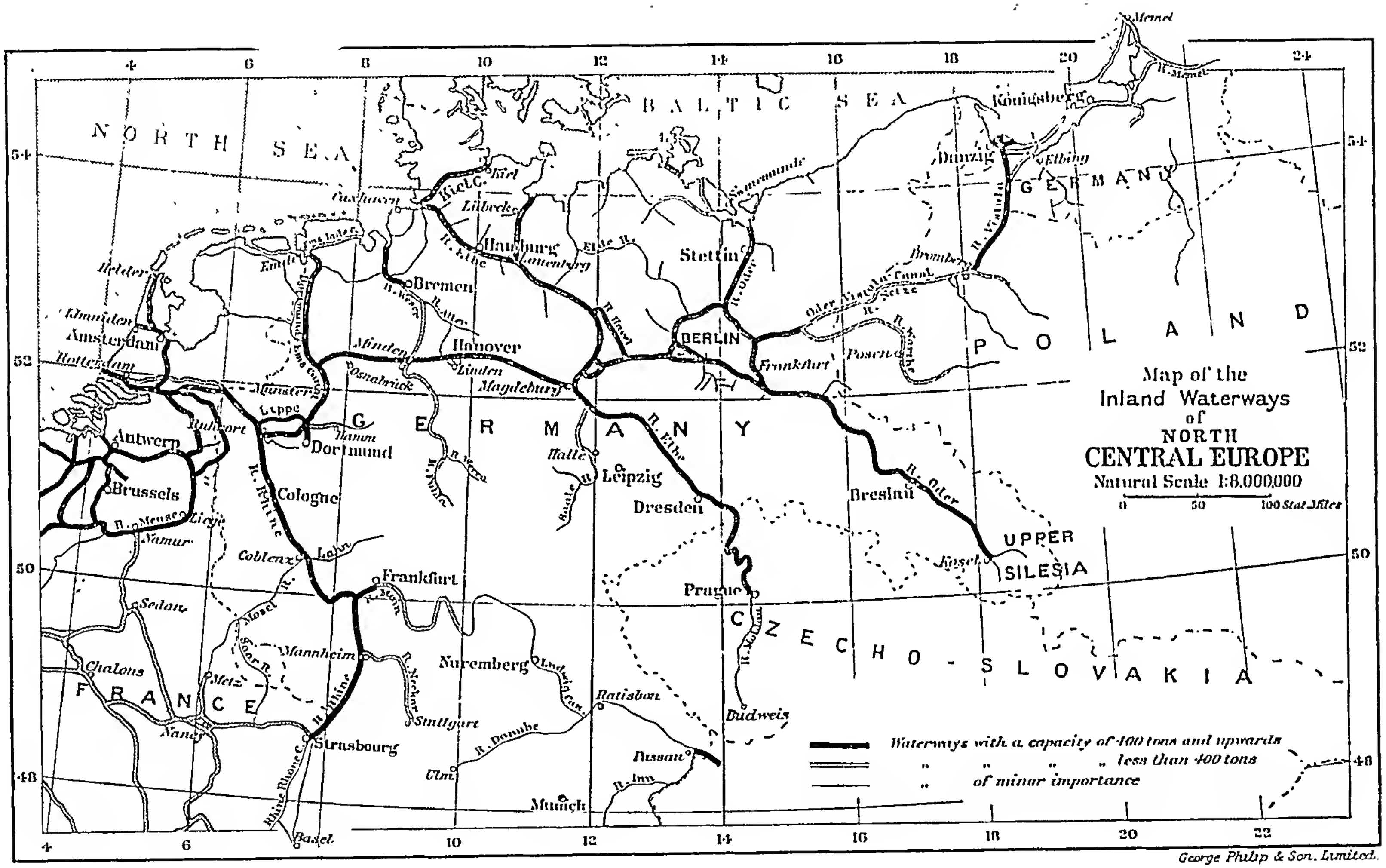
Of the mountains entirely within the German frontier, the Thuringian Forest is crossed by rail, but the Harz Mountains are still a railway barrier for a distance of sixty miles, though railways partly ascend some of the valleys on both sides.

In 1920 all the various German State railways were transferred to the Central Government, but since 1924 they have been

managed and administered by a private company—the German Railways Company. About 1880 the railway mileage was only slightly more than that of the United Kingdom, notwithstanding the greater area and population. Since then, however, the railway system has been extended rapidly, and in the first decade of the twentieth century, when the annual increase of railway mileage had long been declining in the United Kingdom, it still showed a tendency to increase in Germany. Now Germany has a greater railway mileage than this country relatively to both area and population.

In the plains and valleys the natural and artificial waterways are also of great value to the commerce of Germany. The Rhine, the Elbe, and the Oder are all navigable to the neighbourhood of the German frontier or beyond it ; the Fulda and Werra, the two headwaters of the Weser, to about lat. 51° ; the Danube from Regensburg. The length of navigation on the Rhine from Basel, just within the Swiss frontier, is 510 miles ; on the Weser, to the head of navigation on each of its head streams, about 310 miles ; on the Elbe, from the frontier, 450 ; on the Oder, from Ratibor, 480 ; and on the Danube to the frontier, 240.

But neither these figures nor the waterways map on the next page fully indicate the value of German waterways. Of the total length of inland waterways (upwards of 7,500 miles), even before the improvements sanctioned by the law of 1905, 1,870 miles were available for vessels drawing nearly 5 feet, and 1,451 miles for vessels of about $5\frac{3}{4}$ feet draught. Moreover, German waterways still retain their importance. In 1922 the waterways carried 59·3 million tons of goods—more than a quarter of the total carried by the railways. In 1929 the tonnage carried was 110·7 millions and in 1934 94·2 millions. In the smaller post-War area the good waterways are over 4,700 miles. The Rhine navigation as high as Mannheim far excels that of all other German waterways, probably, at least in respect of quantity, that of all other rivers in the world. No other European river has so large a population gathered in large towns on its banks, a circumstance peculiarly favourable to water traffic. The Rhine below Strasbourg as far as the Dutch frontier has been so improved that the minimum depth available enables barges of upwards of 2,000 tons burden to ascend to that port. Extensive harbour accommodation has been provided at Duisburg-Ruhrort, the port of the Ruhr basin, Düsseldorf, the port of the southern part of the great manufacturing district of western Prussia, Cologne, Mannheim-Ludwigshafen, and various other river-ports. Ore-laden sea-going steamers come up to Duisburg, though most of the Rhine traffic is in barges. Three or four large barges, some with a capacity of more than 3,000 tons, are to be seen dragged up and down by a single powerful steam-tug at one time. The river has been greatly improved between Mannheim and Strasbourg—the latter


Map of the
Inland Waterways
of
NORTH
CENTRAL EUROPE
Natural Scale 1:8,000,000
0 50 100 Stat. Miles
Waterways with a capacity of 400 tons and upwards
" " " " less than 400 tons
" of minor importance
NORTH SEA
BALTIC SEA
GERMANY
POLAND
CZECHO-SLOVAKIA
FRANCE
UPPER SILESIA
Königsberg
Danzig
Elbing
Memel
Stettin
BERLIN
Frankfurt
Posen
Breslau
Hamburg
Lübeck
Kiel
Bremen
Hanover
Minden
Osnabrück
Linden
Magdeburg
Halle
Leipzig
Dresden
Prague
Budweis
Dortmund
Cologne
Coblenz
Frankfurt
Mannheim
Strasbourg
Stuttgart
Nuremberg
Ratisbon
Passau
Munich
Ulm
Basel
Metz
Nancy
Chalons
Sedan
Namur
Liège
Brussels
Antwerp
Amsterdam
Rotterdam
Ijmuiden
Helder
Cuxhaven
Emden
Münster
Hamm
Lippe
Ruhrort
R. Rhine
R. Elbe
R. Oder
R. Vistula
R. Weser
R. Havel
R. Danube
R. Main
R. Neckar
R. Meuse
R. Moselle
R. Saale
R. Inn
R. Aller
R. Fulda
R. Werra
R. Warthe
R. Netze
R. Moldau
R. Memel
Oder Vistula Canal
Kiel C.
Dortmund Ems Canal
Ludwig Can.
Rhine Rhone C.
Swinemünde
Lahn
Saar R.
George Philip & Son. Limited.

port is now at the head of effective navigation. Even above Strasbourg the navigation has been so improved that for more than 200 days in the year it is possible for tugs to haul as high as Basel trains of barges of 1,000 tons each, which may have been loaded at London. The results of improvements on this navigation and the Elbe, together with the development of German commerce which they helped to promote, are shown by the increase in the tonnage of goods carried. On the Rhine at Emmerich (on the Dutch frontier) this increased from 2·59 million tons (up) and 1·72 (down) in 1881–5 to 9·04 and 4·13 respectively in 1900 and 17·63 and 13·72 in 1911.

The notable difference in amount between the up- and down-stream traffic on the Rhine is a result chiefly of the dependence of the manufacturing regions of western Germany on imported ores and grain, both being heavy commodities of the kind suited to water-carriage. In the three years 1898–1900 these two classes of commodities made up from 51 to above 59 per cent. of the total up-stream traffic. In 1900 upwards of 40 per cent. of all the grain (66 per cent. of all the wheat) and 44 per cent. of all the ores imported into the German Customs Union passed up the Rhine at Emmerich. Of recent years a large proportion of the ores has been received through Emden. On the other hand, the chief market for the products of the manufacturing districts referred to is internal. Of those which are exported large quantities go by rail to Antwerp and others are diverted to German ports by specially favourable railway rates for export. Coal and coke make up nearly half the tonnage carried down-stream at Emmerich. Duisburg-Ruhrort at the mouth of the Ruhr is the centre of this trade. On the Elbe the up-stream tonnage rose from 1·17 million tons in 1881–5 to 2·78 in 1900 and 5·85 in 1911 ; the down-stream from 1·10 to 2·52 and 4·84. The total had increased to 13·0 in 1929. Of the river traffic at Hamburg, grain (chiefly rye) made up in 1900 nearly 26 per cent. of the up-stream traffic ; but down-stream there were such heavy commodities as sugar (39 per cent. of the total), fertilisers (13 per cent.), coals (5 per cent.). The waterway from Emden to Dortmund with a branch from Herne to Ruhrort is between 11 and 12 feet deep, and can be used for vessels of 1,200 tons. The enlarged Stettin-Berlin Canal, opened in June 1914, receives vessels of 600 tons. Under the Hitler regime steady progress has been made with the gigantic project for the ' Mittelland Kanal '—a central water highway from west to east, now constructed from the Ruhr, through Hanover as far as Magdeburg. The eastern rivers, though they have little traffic in ordinary goods, are still important for the floating of timber.

The ship canal, known as the Kiel (Kaiser Wilhelm or North Sea and Baltic) Canal, completed in June 1895, begins near Brunsbüttel

on the Elbe, and is now large enough to allow of the passage of vessels of any size. It has only two locks, one at either end, and of these, that at the east end is seldom closed, and the other is open for three or four hours in every tide. It causes a saving in distance of 237 miles, from the mouth of the Elbe, and a saving of greater or less amount for all North Sea ports to the south of the Tyne. Though the canal is not used by large liners it is of importance to small vessels as enabling them to avoid the dangerous voyage round the north of Denmark, and the traffic through this canal increased from 1·5 million tons in 1895–96 to 6·0 million tons in 1906, to 6·3 in 1909, and to 8·6 millions in 1911. During 1929, 49,000 merchant vessels aggregating 21·7 million tons passed through the canal, the corresponding figures in 1934 being 44,000 and 16·4 million tons. By the Treaty of Versailles (1919) the Kiel Canal was declared free and open to ships of all nations at peace with Germany, but Germany re-assumed complete control in 1936.

In respect of **climate** Germany is less favourably situated than France, not only through being farther north, but also through being farther east, and on account of the high elevation of a large part of the south-west, that is, the region with the best climatic position both in latitude and longitude. Only in the Rift Valley portion of the Rhine valley (the plain, namely, between the river and the Black Forest) and the valleys of the Neckar and Mosel are there seven months in the year with a mean daily temperature above 50° F., and only in the Middle Rhine district is there one month with a mean daily temperature of 68° F., or more. On the other hand, except in the valleys mentioned, there is a regular increase from west to east in the duration of the period with a mean daily temperature below freezing-point. In a large part of the east this period lasts for at least four months.

This difference in climate results in a difference in the nature of the **crops**. The area under corn crops in Germany, as a result of careful manuring, does not compare unfavourably with that of France, but the crops grown are less valuable than those of the latter country. Wheat (including spelt) occupied in pre-war years about $4\frac{1}{3}$ per cent. of the surface ; rye, the chief bread-plant, nearly 11 per cent. ; oats about 8 per cent. As in Britain, there has been a decrease in land under the plough and in 1929 wheat occupied 3·4 per cent. of the reduced area of the country, rye 10·0, and oats 7·5. Again, as in Britain, wheat has recently increased (to over 5 per cent. under the economic self-sufficiency policy of the Nazi or Hitler regime), but oats have declined in importance. Among green crops by far the most important in extent of ground occupied are potatoes, which cover about ten times as large a surface as in Great Britain. Though vine-cultivation reaches in Germany the most northerly limit in the world, the extent of ground in vineyards (chiefly in the

sheltered valleys of the south-west) is only about one-twentieth of the area so occupied in France. The white ' hocks ' of Germany stand, however, in a class of their own, almost without rivals. In the same region orchards abound, and a limited quantity of maize and tobacco is grown. As to German sugar-beet see p. 200; as to hops see p. 144 ; and as to wool see p. 149.

The development of German agriculture as applied to its two chief bread-plants in pre-War years is very instructive, and may be compared with the table on p. 302 for Britain.

No comparison can be made with this country under the head of rye, but the comparison under the head of wheat is a fair one, inasmuch as in both countries it is grown chiefly where the conditions are specially favourable. The yield of 1,487 kilos per hectare in 1881–90 corresponds to about 22 bushels per acre, as against 28 bushels for the same period in the United Kingdom. There was thus room for improvement by better methods. The rapid increase of railways facilitated those improvements by cheapening the carriage of agricultural machinery and implements and fertilisers, in some kinds of which Germany is exceptionally rich, and by extending the market for the produce. The great increase of railways in the first decade of the twentieth century took place most largely in the agricultural districts. In 1902–11 the average yield had increased to 2,004 kilos per hectare or about 30 bushels per acre, and by 1930 the yield had still further improved to 2,120 or 32 bushels. In the case of rye the yield improved from 1,170 kilos per hectare (18 bushels per acre) to 1,667 kilos (25 bushels) in 1902–11, and about the same in 1930. One notable feature of German agriculture is the large proportion of female labour employed in it—naturally much less now than formerly. At the occupation census of 1907 female employees in agriculture made up 47 per cent. of the total (compare 3·25 per cent. in England and Wales, 13·75 per cent. in Scotland at the census of 1901). According to the German occupation census of 1895 the percentage of female employees was only 33·7, but the difference is partly to be explained by the fact that in 1907 members of a farmer's family working for wages were more careful to get themselves registered as such so as to secure insurance benefits.

In **mineral produce** Germany takes a very high place, ranking among European countries next after the United Kingdom in total value of production. Among the minerals, coal and iron-ore, as in our own country, are the first in importance. The chief coal-basins (see map, p. 409) are that of the Ruhr, in Rhineland and Westphalia ; that of the Saar, in Rhineland, north of Lorraine ; that of Zwickau and Lugau, in the kingdom of Saxony, at the base of the Erzgebirge ; that of Upper Silesia, in the extreme south-east of the province, and that of Lower Silesia, a smaller coal-field to the south-west of Breslau. Germany's production of coal averages

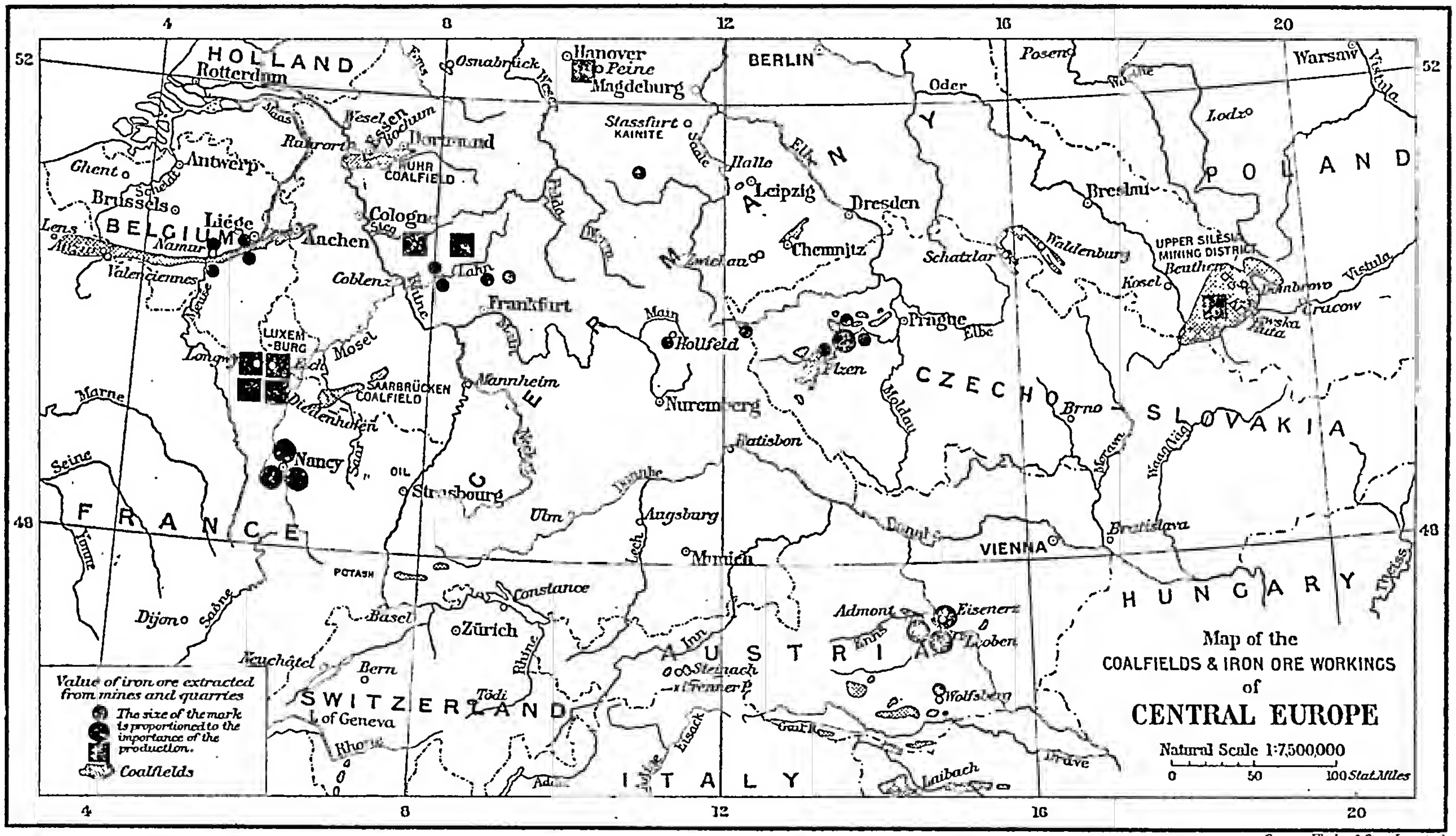
between 100 and 150 million tons, and of lignite about the same amount. Two tons of lignite may be regarded as equivalent to about 11 tons of bituminous coal. The Ruhr yields between 70 and 80 per cent. of Germany's bituminous coal and anthracite. Lignite is abundant in Prussian Saxony, the Thuringian States and parts of the Rhine Valley especially near Cologne, where it has given rise to a large mineral oil industry, and likewise furnishes fuel for numerous sugar refineries. It is important to note that the value of lignite has been greatly enhanced by using it on the spot for the development of electrical power. Vast works have been erected near Halle and Merseburg in Prussian Saxony and at Oppau in the Rhine Palatinate, not far from Worms, for the manufacture of nitrogen fertilisers, and other large installations for long-distance transmission of electrical power, especially in the lignite basins east and west of the Rhine. The production of petroleum, chiefly in Hanover, has acquired considerable importance.

The map on p. 409 shows the principal seats of iron-ore production and their relative importance. Of the deposits to the east of the Rhine and the north of the Lahn, the most important are those of the valley of the Sieg, the Siegerland deposits which, though costly to mine, have a high iron content, 38 to 40 per cent., capable of being increased by calcining to 50 per cent., and are rich in manganese. But by far the greatest production of ores in Central Europe available for the German iron industry is that of the minette ores of Lorraine and Luxembourg, whose position is shown in the west of the map (no longer within the Customs Union—the Lorraine ores now entirely in France, and Luxembourg now in the Belgian Customs Union). But these are so poor in iron and have such a high phosphorus content that they were little developed before the Thomas process (see p. 263) was introduced in 1879. A further stimulus was given to the production of these ores by the expiration of the Thomas patent in 1894. (Compare the diagram on p. 266.) They are very cheap to mine, are so rich in lime as for the most part to need no addition of limestone, and are easily smelted on account of their great porosity. For the smelting of these ores coke had to be brought from the Ruhr basin, a distance of 200 to 215 miles, principally from Gelsenkirchen, a leading coke-making centre in Germany. The trains, however, carried much ore and pig back to feed the furnaces which abound on the coal-field. Even before the War the iron and steel industry of the Ruhr basin was becoming more and more dependent on imported ores from Sweden and Spain. The War, of course, increased this need for foreign supplies. After the War, however, a valuable deposit of ore containing 50 to 60 per cent. of iron and 20 to 30 per cent. of manganese was worked in the Iderwald south of Coblenz. The first coke blast-furnace in the Ruhr basin was set in blast in the early forties of the

nineteenth century. Between the Ruhr and the Emscher lies Essen, with the vast works of Krupp; about 20 miles to the south lie Remscheid and Solingen, the chief seats of the making of cutlery and steel weapons in Germany. The narrow valley known as the Enneperstrasse (Enneper Road), beginning about seven miles north-east of Barmen and terminating at Hagen, is a continuous succession of ironworks and forges. Another important iron industry has existed for hundreds of years in Silesia on and near the coal-fields, but some of the most important industrial seats of this area are now in Poland (see p. 427). One result of the War was that Germany has sought with her highly-skilled labour to push her iron and steel manufactures more largely to the finished stage. As this tendency was already in progress before the War it may be looked upon as permanent.

Zinc and lead are obtained in Silesia and the Rhine province, the latter also elsewhere, but the chief Silesian deposits are now in Poland. In the Rhine Province the chief zinc-producing centre was near Aachen, close to the zinc-producing district of Belgium, but the amount now produced is small. Copper-ore ranks next to iron-ore in value and is produced chiefly in the Harz, at Mansfeld; silver is obtained at Mansfeld and at Freiberg in Saxony.

The chief salt-producing district in Germany is in Saxony, and among the salt-mines of this district, those of Stassfurt are of peculiar scientific interest as well as economical importance. Above an exceptionally pure deposit of rock-salt (containing 98 per cent. of chloride of sodium) there lies a bed of mixed 'potash salts' found here for the first time free in nature. At first these potash salts were merely treated as waste products, but since 1860 they have been made the basis of various chemical industries, and have made Stassfurt the seat of a greater number of chemical factories than are probably to be found on an equal space anywhere else in the world. From the salts as they are found in nature are extracted carbonate of potash, used in soap-making, dyeing, bleaching, glass-making, calico-printing, pigment-making, pottery, &c. The mineral salt kainite, or sulphate of potassium, which contains also a certain proportion of magnesium salts, is used as a fertiliser, and for other purposes. Other layers in the salt-beds yield nitrate of potassium, for making of explosives, glass-making, pickling, &c.; various compounds used in photography, such as cyanide, bromide, and iodide of potassium, besides a great variety of other substances. At the neighbouring town of Schönebeck, on the Elbe, are some very large salt-works.. Numerous borings reaching potash salts have now been made in different parts of Saxony and the adjoining parts of Brunswick, now of the greatest importance, and as no similar deposits on a commercial scale were known outside of Germany, this monopoly induced the Reichstag in 1909 to pass a law con-



George Philip & Son, Limited

trolling the trade—regulating the minimum annual production for the home market, the amount to be exported, and the price per unit of pure potash. The German Combine still controls a large part of the world's trade. The export of pure potash in 1913 was 506,000 metric tons ; in 1919, 175,000. In 1929 the production of potash salts reached nearly 13·0 million metric tons, and in 1934 9·6 million. The present competition with France (Alsace) should be noted.

Despite its natural advantages many causes retarded the development of Germany's resources till about the seventies of last century ; but the very fact that it was then so backward economically caused its advance to be all the more rapid when it began, especially when it received the stimulus from the payment of the indemnity of £200,000,000 after the war of 1870–71. The growth of manufactures was mainly dependent on the development of the home market, for which a protective policy was adopted in 1879, followed by an even more stringent tariff which came into operation on the first of March, 1906. The high degree of protection given to agriculture was a special feature of German tariff policy, and the details given above afford some indication of how German agriculture has increased both the labour supply of the country and the home market, and what is said in the same paragraph as to the concurrent expansion of the railway system will throw some light on the rapid growth of the German iron industry which had to meet large demands directly resulting from that expansion, but also still greater demands in consequence of the developments thereby brought about. It should also be noted that at the time when rapid industrial expansion began to take place Germany was already reaping the fruits of a highly organised educational system which it spared no efforts to maintain at the highest level.

Among the **manufacturing industries** of Germany not directly depending on its agriculture and mining, the most important is that of textiles—woollen, cotton, silk, and rayon. These and other branches of the textile industry have their chief seats on and near the great coal-fields, the Ruhr basin especially being as thickly studded with manufacturing towns as Lancashire or the West Riding of Yorkshire. Barmen and Elberfeld, now known as Wuppertal, here carry on all branches of the textile industry, but above all woollens and silks. Crefeld, west of the Rhine, is, after Lyons and Milan, the leading place in Europe for the manufacture of silks and velvets, and, like Lyons, has the industry favoured by the excellence of the water for dyeing. Aachen (Aix-la-Chapelle), on a small detached coal-field to the south-west, is the chief seat of the manufacture of woollen, as distinguished from worsted, cloth in Germany.

Chemnitz, 'the Saxon Manchester,' a great seat of cotton and other textile industries, as well as of the manufacture of machinery,

is the centre of the manufacturing region connected with the Saxon coal-field ; and Breslau, Görlitz, and Liegnitz are the chief manufacturing towns of Silesia. Görlitz, which lies in one of the districts that acquired for Silesia so great a reputation for its wool, is specially noted for its woollen manufactures as well as its machinery. Thuringia has also a number of centres. Hosiery flourishes chiefly in Saxony and Württemberg (Stuttgart, &c.), and Plauen in the extreme south-west of Saxony is the chief seat of German cotton embroidery.

Notwithstanding the influence of coal in localising textile as well as other industries, it is a noteworthy characteristic, both of the cotton and the woollen industry in Germany, that they are much more widely scattered than in England. This is due, at least in part, to the former organisation of the country into separate states. This difference is particularly striking in the case of cotton-spinning, the leading towns in which are distributed over a large part of Germany to the west of the Elbe, some in places far from any coal-field, though the greater number are in Rhineland (compare Alsace). In 1913, out of twenty-one places with more than 100,000 cotton spindles within the present German boundaries nine were in part of Prussia west of the Elbe, six in Bavaria, five in the kingdom of Saxony, and one in Württemberg. Augsburg, Bavaria, came first with nearly 675,000 spindles, Gronau, on the western border of Westphalia close to the Dutch cotton manufacturing district, second with 645,000. Germany freed itself from its early dependence on Liverpool for supplies of raw cotton. The great German cotton market and place of import of raw cotton is Bremen, the German port having greatest conveniences with respect to the principal towns engaged in the industry. A cotton exchange was established there at the end of 1872, and in 1886 this became a national institution through an arrangement concluded between it and an association of German cotton-spinners. Thus the import of raw cotton at Bremen increased from 158,000 bales in 1870 to 1,567,000 bales in 1900. Specially low railway rates are fixed for the carriage of raw cotton from Bremen to the manufacturing centres. The export of raw cotton from Great Britain to Germany reached its maximum, 775,000 cwts., in 1887. In 1901 it had sunk to 47,000 cwts., but later rose and was over 140,000 cwts. in 1929.

Down to nearly the end of the last century the weaving branch of the textile industries was to a large extent a domestic industry, employing hand-looms, especially in the silk industry and the linen industry of Silesia, and the change from domestic to factory labour was then taking place with great hardship to the hand-weavers. But a rapid change then took place. At the census of occupations in Germany in 1882 more than a fourth of those engaged in textile industries carried on their trade domestically, but at the census of

1895 nearly 90 per cent. of the textile employees worked in establishments employing more than five persons.

Attention may be called to two great industries in which the advanced state of German education was an important contributory cause in bringing them to the high pitch which they reached, especially before the War—the chemical and the electrical industries. Local causes favouring certain chemical industries have already been mentioned. But it was above all in the production of coal-tar dyes that Germany was pre-eminent. The most important step in the history of this industry was the artificial production of alizarin from anthracene by two German chemists in 1868, and from that date to 1914 the technical production of dye-stuffs was almost exclusively in German hands. In each of the large works engaged in this industry large numbers of chemists are constantly employed in making experiments and researches with a view to the continued progress of the industry. As these now carry on their industry on such a scale that they manufacture not only their own semi-raw materials but also subsidiary products which are the special products of the heavy chemical industry, sulphuric acid, nitric acid, soda, caustic soda, &c., requiring large quantities of heavy raw materials, they are all situated on great waterways—at Ludwigshafen opposite Mannheim, seat of the celebrated Badische Anilinfabrik; Leverkusen, on the right bank of the Rhine below Cologne; Frankfurt and Höchst on the Main; Merseburg; Berlin. The electrical industries have developed chiefly since 1891, the year at which at an exhibition at Frankfurt-on-Main power was first transmitted electrically over considerable distances. The chief seats of the industry are Berlin and Nuremberg. For electric installations Germany has the advantage over this country of greater natural water-powers, and in many cases the amount of such power has been increased by the formation of artificial lakes in valleys offering facilities for the erection of dams for this and other purposes. Here Germany took an early lead. A lake was formed in the Edertal in Waldeck with a capacity of about 6,200, one in the Mölmetal, an eastern tributary of the Ruhr in Westphalia, a capacity of about 4,200, and one in the Urftal in the Eifel, a capacity of about 1,600 millions of cubic feet. Still more important are the great Walchen-Kochelsee power works.

One of the most notable developments of German industry in pre-War years was in shipbuilding and marine engineering. The progress of shipbuilding in Germany, which has advantages for the industry in some respects similar to those of the United Kingdom, along with special assistance in the form of reduced railway rates for shipbuilding materials, kept pace with the growth of her shipping. The chief establishments are at Stettin, where the Vulcan Company has built some of the largest liners afloat, the Weser ports, Hamburg

and Elmshorn (below Hamburg), Kiel, Lübeck, Rostock, and Flensburg. River-steamers are also built at Dresden and other river-ports.

Among other notable German manufacturing industries may be mentioned the clockmaking and toymaking of the Black Forest and Thuringia, mainly, at least in the early stages, domestic industries of an agricultural population ; the porcelain manufactures of Meissen, which has the famous old royal factory of 'Dresden' china, of Zwickau, and Berlin ; the making of pianos in Berlin, Stuttgart, Leipzig, and Dresden ; and of scientific instruments in many university towns, but chiefly in Munich and Jena. The vast leather industry has its chief seats in the south, but it is also carried on to a large extent in Schleswig-Holstein and the Rhineland.

The **foreign commerce** of Germany showed before the War a more noteworthy development than that of any other European country. The circumstances already mentioned as favouring internal development in Germany go far to account for this, even if the German exports are to be regarded as a comparatively small overflow of production carried on mainly for the home market. The Tables of exports and imports given below show some very remarkable features, some of which correspond in a striking manner with certain features of British trade. From 1872–80 (5-year averages) there was a great excess of imports over exports. In 1881–85 these were brought almost to an equality. In the subsequent periods there was, as in the United Kingdom, a progressive increase in the excess of imports over exports. For three periods in succession, 1881–85 to 1891–95, the value of the exports was nearly stationary, and it is noteworthy that the slight decline in 1891–95 was in spite of the fact that that is the first period in which the trade of Hamburg and Bremen was included in every year of the period. In 1896–1900, and again in 1906–10, there was a great expansion in the value of the exports, just as in the United Kingdom. Another striking correspondence with the British trade is to be found in the fact that the exports which in the later periods before the War showed a relative growth were not the products of the great textile industries (woollen, cotton, silk), which had long been important in Germany, nor pig and unwrought iron, the first products of an industry which had been expanding with great rapidity in Germany, but above all machinery, and that coal showed a steady rise in percentage, though not nearly so rapid. The steady rise in the proportion of leather, but not of leather wares, may also be noted, as likewise the fact that a relative decline in the value of the sugar export had begun even before the abolition of bounties in 1903. On the import side attention may be called to the steady rise in the import of coal, to the large import of grain and the much more rapidly rising import of eggs, as well as to the fact that the

percentage value of the import of yarns steadily declined. We may note as favouring external commerce not only the facilities for communication with the seaboard, but also that Germany is surrounded by some of the wealthiest countries of Europe, all, except Russia, having railways on the same gauge, and that through the Alpine tunnels this advantage, at least for commodities of relatively high value, is continued into Italy. The special importance of the St. Gotthard tunnel to Germany may be seen from one example. In 1880, before the opening of the St. Gotthard tunnel, the quantity of iron and steel in plates and bars of 5 millimetres (0·2 inch) or more in thickness imported into Italy from the United Kingdom was nearly 60 per cent. of the total under this head (the largest under the general head of iron and steel), that from Germany 2 per cent. In 1890 the proportion derived from the United Kingdom was less than 22 per cent., that from Germany more than 52 per cent.; and more than nine-tenths of Germany's share was introduced by land. Still, the greater part of German commerce is carried on by sea, and, as in the British Isles, there is a very large amount of trade in bulky articles. In Germany, however, the preponderance of bulky articles in the sea-borne trade is on the import side—coal, ores, grain, petroleum, fertilisers. Germany's large import of timber is mainly from, as that of coal was mainly to, countries on her land frontier, and probably her bulkiest exports by sea are those which come under the head of iron and steel wares. This state of things can hardly but be favourable to outward sea-freights, and no doubt contributes largely to the explanation of the fact that the German export of cotton manufactures came to be second to our own.

For the despatch and reception of its transmarine exports and imports Germany is partly dependent on foreign ports—those of Belgium, Holland, France, Italy, and Yugoslavia. None of its own seaports is so conveniently situated for the commerce of the chief mining and manufacturing region of the west as Antwerp or Rotterdam. It has been a very definite part of recent policy, however, especially under the Nazi régime, to divert trade to German ports. Both recent canal development as well as improvements at the ports themselves have been directed towards this end. There are very few German seaports with a sufficient depth of water for ships of the largest size. Down to the last decade of the nineteenth century the only two with a depth of more than 25 feet were those of Bremerhaven, the outport of Bremen, on the Weser, with the adjoining Prussian port of Geestemünde, and Cuxhaven, the outport of Hamburg; but since then Hamburg, Bremen, and Emden, all North Sea ports, have been added to the number. The basins at Hamburg now have a depth sufficient to accommodate the largest liners afloat. The port further has the advantage of being comparatively free from fog, and by means of ice-breakers it is kept

always open. The most has been made of the natural advantages of the port—its vast hinterland accessible by land and water, its small tidal range (permitting the development of the open basin system—*cf.* Southampton), and its relative nearncss to the sea. It is not surprising that it has become not only the premier port of Germany, but a premier port of the world. At Bremen also the channel is always kept free from ice. At Bremerhaven the depth exceeds 35 feet. Bremen proper was long a seaport without ships, since even small sea-going vessels ascended the Weser no highcr than Vegesack, about ten miles below Bremen. At Emden the depth at ordinary high water is 33 feet. Swinemünde, the outport of Stettin on the Odcr, has a depth of 24 feet.

The principal other German seaports are the Baltic ports of Lübeck and Travenünde, on the inlet that receives the river Trave, Rostock on the Warnow, Stralsund, opposite the island of Rügen, Anklam on the Peene, Stettin, Königsberg on the Pregel. Bctween the mouth of the Oder and Danzig, on a coastline of about 250 miles, there is no seaport of any consequence. Kiel is an important station of the German navy, and Wilhelmshaven on the Jahde, west of the mouth of the Weser, is used solely for this purpose.

Of all the German seaports, by far the most important at the present day is Hamburg, including Cuxhaven. Like Liverpool, however, Hamburg has risen to a dominant position among seaports only in comparatively rccent times. English and Dutch settlers, after the discovery of the sea-way to the East, first made it an active scene of shipping, but the chief impetus to the development of its trade was given only in the eighteenth century, when the American war of independence opened it to various colonial ports. With the development of American and other trans-oceanic commerce that has since taken place, Hamburg has steadily risen in population, wealth, and commerce, its admirable water-communications upwards as well as downwards greatly favouring its growth. The only bridges across the Elbe here are at the upper end of the city, but a tunnel for passengers and vehicles lower down was opened in 1911, and there is now a motor bridge to Harburg. Altona, the Prussian seaport immediately adjoining Hamburg, has a similar trade and since 1837 has formed part of Hamburg administratively.

Bremen, with its outport of Bremerhaven, is the only other German seaport with a large American and trans-oceanic commerce. Lübeck, before the commencement of trans-oceanic commerce the most important of all German seaports, began to decline in the fifteenth century, and has only revived in the present century. During the fourteenth century one of its rivals was Wismar, on the coast to the east, but this port has sunk into complete insignificance, and its commerce has passed to the still more easterly port of Rostock. Stettin derives a good deal of its importance from being

the nearest seaport to Berlin, as well as from its connections with the populous region of Upper Silesia. The eastern port of Königsberg has a large export trade in timber, grain, flax, hemp, potatoes, and other agricultural products.

The difference in the relative importance of German seaports in former times and now is partly due without doubt to political causes, but it is possible also to recognise geographical causes as powerfully operating at the same time. In trying to account for the predominance of Lübeck in the Middle Ages one must first notice that the narrowness of the Baltic Sea and the number of islands within it favoured the rise of shipping in the infancy of navigation. Short voyages brought a greater number of ports into communication with each other than on the North Sea, more particularly the German shores of the North Sea. The difficulty of communication by land contributed here as elsewhere to the rise of numerous ports, each having for the most part a small hinterland except where they stood at the mouth of a great navigable river, and generally the importance of a seaport was in direct relation to the importance of the waterway which enlarged its hinterland. In early times *Julin*, close to the site of the modern Wollin, was an important port at the mouth of the Oder, and it is noteworthy that being a Slavonic town it stood on that mouth of the Oder which is turned towards the Slavonic east. When it was destroyed by the Danes in 1177, the Teutonic town of Stettin, already several centuries old, promptly took its place, and has held that place ever since. Danzig and Elbing were in the Middle Ages equally accessible ports at the mouth of the Vistula and were rivals for the trade of that river; Königsberg had a corresponding importance as the outlet of the Pregel. None of the ports of this region, however, had any great consequence till order was established there by the knights of the Teutonic order in the period after 1230. Elbing and Königsberg were both foundations by that order, and though Danzig is a much older town it did not attain prosperity till after it was purchased by that order in 1309. Lübeck, the most important of all the Baltic ports and indeed of all German ports in the Middle Ages, is an obvious exception to the general rule above stated as mostly determining the relative importance of seaports. Its river is comparatively insignificant. But it is to be noted that there is a very important trade in western Germany, including the trans-alpine trade in the valuable products which had to be brought into connection with the Baltic ports in the aggregate, and manifestly no other port is so conveniently situated for that purpose as Lübeck. This was so even before there was any waterway from Lübeck to the Elbe, a fact clearly indicated by a significant exception in the privileges conferred by Henry the Lion on Lübeck in 1167. Lübeck was then granted among other things exemption from all tolls and

customs in Henry's duchy of Saxony except at Artlenburg. Artlenburg is situated on the left bank of the Elbe at a point nearly due south of Lübeck, and nearly opposite the southern end of the subsequent Steckmitz and the present Elbe-Trave Canal. It is fair to surmise that already in 1167 the dues collected there were too valuable to forgo, which implies that the trade across the Elbe at this point was by this time important. One large item in that trade in the twelfth and subsequent centuries was Lüneburg salt, a very valuable commodity when salt fish and salt meats formed a much larger proportion of the food of the people than now. But Lüneberg was only one station on a land route leading south-westwards along the base of the German highlands, and tapping the trade also of the Weser and the Rhine. Important mediæval remains, not only at Lüneburg, but also at Hanover, Minden, Osnabrück, and Münster, still bear witness to the former importance of this route, by means of which the valleys of the Elbe, Weser, and Rhine were all brought within the hinterland of Lübeck in relation to the Baltic trade. This hinterland was made much more accessible when Lübeck merchants constructed the Stecknitz Canal in 1390–98, and even at the present day the importance of the relations of the Baltic as a whole through Lübeck with western and south-western Germany is shown by the immediate success of the Elbe-Trave Canal (depth $8\frac{1}{6}$ feet), which was opened in 1900, and now takes the place of the Stecknitz Canal. It is adapted for ships up to 800 tons burden. Vessels of this size can ascend the Elbe as high as Aussig, the chief lignite river-port of Czechoslovakia, about 400 miles above Hamburg. The opening of the canal developed a large trade between the upper Elbe and the Baltic, especially the eastern Baltic ports. From this cause the shipping of Lübeck in 1902 (a year of depression in the German shipping trade generally) was twice that of 1901.

When trans-oceanic shipping came to surpass in importance that of the Baltic, the advantages of Hamburg were just as decisive as those of Lübeck had been formerly. Of the total tonnage of German shipping in 1830, 64·5 per cent. belonged to the Baltic, 35·5 per cent. to the North Sea ; in 1910 only 10·6 per cent. belonged to the Baltic, 89·4 per cent. to the North Sea, a proportion which is still roughly maintained. The Elbe and its tributaries gave access to central and southern Germany as well as Bohemia, and the construction of the short Friedrich Wilhelm Canal connecting the Spree with the Oder, as far back as 1662–68, brought the upper Oder also within the hinterland of Hamburg, at least in relation to trans-oceanic shipping. Subsequent improvements have enhanced these advantages. Since 1897 vessels of 400 tons have been able to ascend past Breslau to Kosel, the port of the coal and zinc-mining region of Upper Silesia. As the waterways had to a large extent

determined the importance of German towns before railways were introduced, the railways have been made to follow the lines of the chief waterways, and thus to confirm the connections already established. Additional importance was of course given to Hamburg by the development of the coal, lignite, salt, and other mines which have helped to maintain and expand the manufacturing industries of Saxony and Bohemia. Bremen has not nearly so extensive a hinterland as Hamburg, but it has the advantage of being nearer America, a matter of some importance for passenger traffic, and nearer the coal-field of the Ruhr basin, a matter of great importance so long as political considerations lead to the diversion of a large part of the trade of that region from its natural ports of Rotterdam and Antwerp.

During the Middle Ages the commerce of Germany was greatly promoted by the Hanseatic League, a confederacy which at the time of its greatest extension and influence embraced nearly all the sea- and river-ports of modern Germany and the Netherlands up to Cologne on the Rhine, Magdeburg and Halle on the Elbe and Saale, Frankfurt on the Oder, and Thorn (Torun) on the Vistula. At what date it was founded is uncertain, but before the close of the thirteenth century it was powerful enough to check the disorders to which its rise was due, piracy at sea, and the rapacity of the numerous petty princes and ecclesiastical dignitaries among whom Germany was at that time divided, the authority of the German emperors being then little more than nominal. The armed forces which it maintained, especially at sea, procured respect for it, and powerfully contributed towards the acquisition of privileges which at sundry times it obtained in foreign countries. Its internal organisation varied at different times. At one time it formed three great divisions, one with Lübeck, one with Wisby on Gothland, and one with Cologne at the head. At another time (after 1367) there were four great groups under the presidency of Lübeck, Cologne, Brunswick, and Danzig respectively. At all times, however, Lübeck had the chief place. There the diet met, and there the archives of the confederacy were kept. Abroad the confederacy had four great factories—at Bruges, London, Bergen, and Novgorod (on the Volkhov). The confederacy began to decline in importance in the sixteenth century, when the German emperors recovered some of their power, and England, Scandinavia, and Russia had also become more powerful. It finally sank into complete insignificance during the Thirty Years' War (1618–48), which had such a prolonged disastrous effect on Germany generally.

All the Baltic ports are subject to the inconvenience of being closed by ice in winter, and the interruption of traffic from this cause is of course longer the farther east the port lies.

Of the larger inland towns, Munich, Dresden, Stuttgart, and

Brunswick, besides Berlin, owe much of their importance to their still being local capitals. Frankfurt-on-Main, moreover, was at one time in a sense the capital of Germany, and Hanover the capital of a separate kingdom. It is chiefly to its rank as capital, together with its central position in the German plain, that Berlin, which is a town of comparatively modern growth, owes its commercial importance. Like other large capitals, it is the seat of many industries (the making of machinery of all kinds being that for which it is most noted), and after the establishment of the German Empire it became the chief centre of banking and exchange in succession to Frankfurt-on-Main.

Local conditions have made Breslau an important centre of commerce from an early period. It arose at the only convenient crossing-place of the Oder for a considerable distance up and down, and as far back as the twelfth century it is mentioned (under the name of Wratislaw) as the chief city of Silesia. For seven centuries it was the place where the industrial products of the West were exchanged for the agricultural products of the East, and the commerce of this nature was greatly increased by the developments of industry in consequence of the existence of two coal-fields as well as other mineral deposits in the vicinity. It hence became the place of convergence of all the south-eastern railways. Six per cent. of the inhabitants were, until the Nazi régime, Jews.

Munich, though situated on an inhospitable plateau, was already the capital of a Bavarian duchy in 1255, but only grew into importance after Bavaria became a considerable state, about the beginning of the nineteenth century. The size which it had already attained at the time of the introduction of railways naturally caused it to be selected as a railway centre, and the commercial advantages which it derived from that circumstance were all the greater from the fact of its being the most convenient place of division of the commerce which passed across the Alps by way of the Brenner. One important line of railway proceeds from Munich north-westwards by way of Augsburg and Frankfurt to the most populous region of the Rhine basin ; another northwards to Saxony and Berlin by way of the Naab valley (which in earlier times helped to give a now lost importance to Regensburg or Ratisbon on the Danube) ; a third north-eastwards to Prague. It thus to a large extent superseded not only Augsburg but also Regensburg and Ulm.

Of the other inland towns not already particularly noticed, that which is of most interest on commercial grounds is Nuremberg, and the interest in this case arises from the fact of its being an old industrial town whose manufacturing industry was chiefly maintained in earlier periods by its favourable situation for trade. It lies in a basin surrounded by hills, through which, however, there are openings in all directions which have made it a natural point of

concourse for all south-west Germany. Other natural advantages, on the other hand, it lacked. Special privileges were granted to it by the Emperor Frederick II. in 1219, expressly because it had neither vineyards nor shipping and lay upon the most sterile soil (' auf rauhestem Boden '). In the Middle Ages it was the chief manufacturing town in Germany, and though in modern times it has been eclipsed by other manufacturing towns with greater advantages according to modern requirements, it has never lost the stamp of an industrial and commercial city. The characteristic manufactures of the place are such as might be expected from its history and position, being those which demand little material and little expenditure of mechanical power, but much skill on the part of the workmen. Besides the making of toys, material for which is, or was originally, supplied by neighbouring forests, and pencils made with graphite from Passau and elsewhere, various kinds of artistic metal-work and the manufacture on a large scale of electrical apparatus furnish the chief employment of the industrial population. The early importance of the town is indicated by its having long been known in England under an English form of name.

In the Middle Ages, when trans-alpine commerce had a high degree of relative importance, Ratisbon, Nuremberg, Augsburg, Ulm, and Frankfurt all reached a high degree of prosperity in connection with that trade. Ratisbon owed its commercial, and hence also a high degree of political, importance to its connections with the traffic on the Danube and that across the Brenner, the entrance to which route is made where the Inn valley emerges on the high plains of Bavaria immediately to the south. When Constantinople was the capital of a Christian empire and as such the focus of a great trade in valuable commodities, one of the routes leading from it was that of the Danube to the heart of Europe. At Ratisbon goods would leave the river for the Elbe basin and for Frankfurt and the gorge of the Rhine, or join the river from those directions, and for all these reasons it was a highly important focus. Nuremberg stands directly on the route from Ratisbon to Frankfurt, and without doubt this circumstance would contribute to its early commercial and industrial development. Ulm, situated on the banks of the Danube, lies at a point where an easy route leads across the Black Forest to the middle Rhine valley, and almost due north of the opening, through the upper Rhine valley, at the head of Lake Constance, of many pass-routes leading across the Alps. Augsburg again was at the fork of the roads leading, on the one hand, to the Rhine valley passes just referred to, on the other hand across the Seefeld Pass to Innsbruck and so to the Brenner. The surviving palace of the celebrated Augsburg house of the Fuggers at Trento on the latter route is a notable witness to the importance of the Augsburg connections of former days in this direction. The

railway from Innsbruck to Augsburg *via* Munich was only completed after the War. In addition to the advantage of situation above indicated, Frankfurt served to connect the valley of the middle Rhine with the Weser and Elbe valleys and Lübeck, and the importance of these relations is still illustrated by the railway connections of the city.

A large part of the foreign trade of Germany is still carried on through Dutch, Belgian, and other ports. In 1912 the value of German consignments that came to Great Britain direct from German ports was £36·81 out of a total of £70·05 millions or 54 per cent. Of the remainder, 33 per cent. passed through Dutch and 13 per cent. through Belgian ports—a clear proof of the greater importance of Rotterdam and Flushing than Antwerp and Ostend to Germany in respect of its British trade. About one-half per cent. reached us through French ports. The influence of recent policy has, however, been mentioned above. Against this, agreements between Italy and Germany may lead to a greater use being made of Genoa.

Towns of Germany, 1933

Berlin	4,243,000	Bremen	323,000
Hamburg	1,129,000	Königsberg	316,000
Cologne	766,000	Bochum	315,000
Munich	735,000	Magdeburg	307,000
Leipzig	713,000	Mannheim	275,000
Essen	654,000	Stettin	271,000
Dresden	642,000	Altona	242,000
Breslau	625,000	Kiel	218,000
Frankfort-on-Main	556,000	Halle	209,000
Dortmund	541,000	Oberhausen	192,000
Düsseldorf	499,000	Augsburg	176,000
Hanover	444,000	Kassel	175,000
Duisburg	440,000	Brunswick	167,000
Stuttgart	415,000	Krefeld	165,000
Nürnburg	410,000	Aachen	163,000
Wuppertal	409,000	Wiesbaden	160,000
Chemnitz	351,000	Karlsruhe	155,000
Gelsenkirchen	333,000		

GERMANY[1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.								
	1872–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29[11]
1. Grain	—	—	—	—	29·17	34·73	45·56	57·09	62·48
Grain, flour, and meal	19·59	18·50	15·25	23·24	32·37	—	—	—	—
2. Cotton, raw and waste	19·59	9·33	11·64	10·64	12·95	19·89	25·87	29·52	35·97
3. Hides and skins, raw	4·74	4·69	4·37	5·19	6·90	10·62	20·25	26·35	12·73
4. Chemicals, drugs, and dyes	—	—	—	—	14·73	17·84	19·44	19·88	12·72
5. Raw wool	9·61	9·71	11·85	11·78	12·66	13·88	17·94	16·47	27·73
6. Timber and builders' material	—	—	5·55	7·19	12·56	10·78	13·54	—	19·31[3]
7. Yarns, cotton and wool	—	6·87	7·59	7·37	8·04	7·23	10·82	10·81	24·66
8. Copper, raw and scrap	1·43	0·72	0·97	1·74	4·51	5·79	10·75	14·93	16·67
9. Animals, living	7·90	9·05	8·32	11·15	7·28	10·07	9·78	9·93	6·94
10. Silk, floss, waste, and cocoons	4·94	6·13	7·52	6·16	6·40	7·23	8·82	7·06	6·23
11. Coal	2·09	1·12	2·18	3·14	4·10	5·03	8·49	9·58	8·05
12. Coffee	8·26	6·12	8·83	10·18	7·58	7·56	8·46	12·55	14·03
13. Caoutchouc and gutta-percha	—	—	—	1·23	2·74	4·34	7·51	8·77	6·99
14. Eggs	—	—	1·87	3·22	4·21	5·55	7·40	9·24	14·16
15. Grease and oleo-margarine	1·60	1·41	1·82	3·14	3·47	4·99	7·31	6·68	11·60
16. Iron ore	—	—	0·72	1·16	2·77	3·97	7·02	10·20	12·77
Average total value	174·0	153·0	171·9	198·5	249·0	300·3	412·1	519·46	628·95

Principal Articles.	Percentages of Total Value.								
	'72–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Grain	—	—	—	—	11·7	11·6	11·1	11·0	9·9
Grain, flour, and meal	11·3	12·1	8·9	11·7	13·0	—	—	—	—
2. Cotton, raw and waste	6·1	6·1	6·8	5·4	5·2	6·6	6·3	5·7	5·7
3. Hides and skins, raw	2·7	3·0	2·5	2·6	2·8	3·5	4·9	5·1	2·0
4. Chemicals, drugs, and dyes	—	—	—	—	5·9	5·9	4·7	3·8	2·0
5. Raw wool	5·5	6·3	6·9	5·9	5·1	4·6	4·4	3·1	4·4
6. Timber and builders' material	—	—	3·2	3·6	5·0	3·6	3·3	—	3·1
7. Yarns, cotton and wool	—	4·5	4·4	3·7	3·2	2·4	2·6	2·1	3·9
8. Copper, raw and scrap	0·8	0·5	0·6	0·9	1·8	2·2	2·6	2·9	2·7
9. Animals, living	4·5	5·9	4·8	5·6	2·9	3·4	2·4	1·9	1·1
10. Silk, floss, waste, and cocoons	2·8	4·0	4·4	3·1	2·6	2·4	2·1	1·4	1·0
11. Coal	1·2	0·7	1·3	1·6	1·6	1·7	2·1	1·8	1·3
12. Coffee	4·7	4·0	5·1	5·1	3·0	2·5	2·1	2·4	2·2
13. Caoutchouc and gutta-percha	—	—	—	0·6	1·1	1·4	1·8	1·7	1·1
14. Eggs	—	—	1·1	1·6	1·7	1·8	1·8	1·8	2·3
15. Grease and oleo-margarine	0·9	0·9	1·1	1·6	1·4	1·7	1·8	1·3	1·8
16. Iron ore	—	—	0·4	0·6	1·1	1·3	1·7	2·0	2·0

COUNTRIES[4] OF ORIGIN AND DESTINATION (PERCENTAGES)

From	1891–95	'96–00	1901–05	'06–10	'11–13	'25–29
1. United States, including Puerto Rico and Panama Canal	11·4	15·6	15·5	15·0	14·4	15·2
2. Russian Empire	11·5	13·4	13·5	14·3	14·2	2·7[9]
3. United Kingdom	13·5	12·2	9·9	9·5	7·8	6·6
4. Austria-Hungary[5]	13·8	12·5	11·7	9·3	7·4	1·5
5. France and Algeria[6]	5·8	5·4	5·7	5·8	5·4	4·1
6. Argentina	2·5	3·1	4·5	4·9	4·0	6·2
7. British East Indies[7]	4·0	4·2	4·5	4·8	4·6	4·6
8. Belgium	4·9	4·0	3·6	3·5	3·3	3·2
9. Italy	3·2	3·2	3·1	3·2	2·8	3·6
10. Netherlands	5·1	3·7	3·4	2·9	3·0	5·3
11. Australia and New Zealand	2·1	2·0	2·1	2·7	2·5	2·5[10]
12. Brazil	3·1	2·0	2·3	2·6	2·7	1·8
13. Switzerland	3·4	3·1	2·7	2·2	1·9	2·4
14. Netherlands East Indies	1·0	1·4	1·6	2·1	1·9	2·9
15. Sweden	1·4	1·9	1·5	1·8	1·9	2·3

To	1891–95	'96–00	1901–5	'06–10	'11–13	'25–29
1. United Kingdom	21·2	19·3	19·4	15·6	11·5	10·5
2. Austria-Hungary[5]	11·1	11·0	10·3	11·0	10·1	3·3
3. United States	10·9	9·8	9·3	9·0	11·3	7·1
4. Russian Empire	5·1	7·7	6·9	7·7	7·9	3·8[9]
5. Netherlands	7·9	7·5	8·1	6·8	5·4	10·4
6. France, Algeria and Tunis[8]	6·6	5·6	5·4	6·8	6·7	5·1
7. Switzerland	6·0	6·6	6·0	6·2	4·4	4·6
8. Belgium	4·8	5·1	5·4	5·2	4·5	3·6
9. Italy	2·7	2·5	2·7	4·3	3·9	4·4
10. Denmark	2·6	2·9	2·9	3·0	2·4	3·7
11. Argentina	1·0	1·2	1·6	2·7	3·6	2·8
12. Sweden	2·3	2·8	2·6	2·6	2·2	3·7
13. British East Indies	1·3	1·5	1·7	1·6	0·9	2·0
14. Norway	1·3	1·6	1·3	1·4	1·2	1·6
15. Japan	0·6	1·2	1·1	1·3	1·0	1·9

For notes, see page 423.

GERMANY[1]

SPECIAL EXPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1872–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29[11]	Percentages of Total Value. '72–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Iron and steel	—	—	—	—	19·02	29·28	39·77	59·38	75·01	—	—	—	—	9·8	11·8	12·0	13·1	13·8
Iron wares, coarse	—	*4·66*	*4·74*	*4·99*	*7·62*	*10·37*	*11·97*	*29·26*	—	—	*3·1*	*3·0*	*3·3*	*3·9*	*4·2*	*3·6*	*6·5*	—
,, ,, fine	—	—	*1·31*	*2·72*	*4·49*	*7·53*	*11·75*			—	—	*1·2*	*1·8*	*2·3*	*3·1*	*3·5*		
2. Chemicals, drugs, and dyes	—	—	—	—	18·73	22·64	30·17	36·01	55·71	—	—	—	—	9·7	9·2	9·1	8·0	10·3
3. Machinery and locomotives	1·66	2·75	2·81	3·53	7·42	10·61	21·55	30·91	42·29	1·4	1·8	1·8	2·3	3·8	4·3	6·5	6·8	7·8
4. Cottons	—	3·59	7·22	7·72	9·62	14·77	18·31	20·95	20·89	—	2·4	4·6	5·1	5·0	6·0	5·5	4·6	3·9
5. Coal and coke	—	—	5·27	6·79	10·10	13·37	18·26	28·67	40·12	—	—	3·4	4·5	5·2	5·4	5·5	6·3	7·4
6. Woollens, cloths and stuffs	—	8·73	8·81	7·69	7·81	9·21	10·30	13·11	15·47	—	5·7	5·7	5·0	4·0	3·7	3·1	2·9	2·9
,, hosiery and other	—	—	—	—	2·80	2·86	2·77			—	—	—	—	1·4	1·2	0·8		
7. Grain, flour, and meal	—	—	—	2·16	5·44	6·42	12·29	19·83	9·43	—	—	—	1·4	2·8	2·6	3·7	1·4	1·8
Grain, flour, potatoes, &c.	11·95	4·19	2·65	2·25	—	—	—	—	—	10·3	2·7	1·7	1·5	—	—	—	—	—
8. Hides and skins, total	—	—	—	—	4·30	7·67	12·24	13·31	13·00	—	—	—	—	2·2	3·1	3·7	2·9	2·4
9. Sugar, total	0·52	8·36	8·46	10·14	10·80	8·95	10·15	10·96	2·45	0·4	5·5	5·4	6·7	5·6	3·6	3·7	2·4	0·5
,, *refined*	—	*1·82*	*2·92*	*4·40*	*5·40*	*5·56*	*6·16*	—	—	—	*1·2*	*1·9*	*2·9*	*2·8*	*2·2*	*1·9*	—	—
,, *raw*	—	*6·55*	*5·54*	*5·74*	*5·40*	*3·39*	*3·90*	—	—	—	*4·3*	*3·6*	*3·8*	*2·8*	*1·4*	*1·2*	—	—
10. Silk manufactures	2·92	8·32	9·26	6·62	6·35	7·29	9·37	9·78	10·00	2·5	5·4	6·0	4·3	3·3	3·0	2·8	2·2	1·9
11. Leather	1·19	2·03	2·09	2·61	3·19	5·11	8·30	11·02	11·55	1·0	1·3	1·3	1·7	1·6	2·1	2·5	2·4	2·1
13. Yarns, cotton, and wool	—	2·90	2·98	2·91	3·51	4·56	5·39	7·45	11·53	—	1·9	1·9	1·9	1·8	1·8	1·6	1·6	2·1
14. Wearing apparel	—	—	5·38	4·58	5·84	7·07	5·25	6·05	7·68	—	—	3·5	3·0	3·0	2·9	1·6	1·3	1·4
24. Leather wares, exclud. gloves	1·86	4·60	5·09	3·39	3·10	2·28	2·58	4·90	4·91	1·6	3·0	3·3	2·2	1·6	0·9	0·8	1·1	0·9
Animals, excluding horses	4·01	6·04	2·76	0·73	0·46	0·53	0·22	—	—	4·2	3·9	1·8	0·5	0·2	0·2	0·1	—	—
Average total value	116·4	152·5	155·6	152·4	194·1	246·6	333·1	452·65	538·71									

[1] Wirtschaftsgebiet or Economic Union, including the free ports of Hamburg, Cuxhaven, Bremerhaven, and Geestemünde from March 1, 1906; previously Zollgebiet or Customs Union.

[2] 'Official values' revised annually, but since April 1909 'declared values' have been recorded for imports of vehicles, ships, &c., and for about 70 per cent. of the export articles, and for all exports and imports since 1921 'declared values' have been used. Totals include ships and improvement trade for home account after 1896.

[3] Wood, raw.

[4] The Hanse towns were included in the Customs Union in 1889. For the five years previous 16·8 per cent. of the imports and 24·9 per cent. of the exports were credited to them, whereas in 1891–95 the figures were 0·3 per cent. and 1·3 per cent. respectively.

[5] Figures for 1925–29 are for Austria only.

[6] Algeria 0·3 per cent. in 1906–10.

[7] Figures for 1911–13, 1925–29, are for British India (German Year Book).

[8] Algeria and Tunis 0·1 per cent. in 1906–10.

[9] U.S.S.R.

[10] Australia.

[11] Average exchange rate, 20·38 marks = £1 sterling.

GERMANY

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*29·2*	*25·3*		
Wheat	2·0	4·0	1·5		
Barley	1·2	2·5	0·7		
Maize	1·0	1·6	0·8		
Other cereals	2·5	1·3	1·2		
Fruit	3·5	3·4	5·8		
Coffee	1·3	2·4	3·0		
Butter and margarine	2·1	3·2	2·5		
Eggs	1·5	2·3	2·2		
Raw materials	—	*49·3*	*52·7*		
Oil fruits and seeds	2·9	5·9	5·7		
Raw cotton	8·6	5·5	6·0		
Raw wool	6·8	4·3	4·3		
Wood (raw)	2·0	3·0	2·3		
Raw copper	1·5	2·6	2·6		
Mineral oils	—	2·5	3·4		
Iron ore	0·7	2·0	1·9		
Fur skins	1·7	2·0	2·2		
Raw tobacco	2·3	1·9	2·8		
Hides and calf-skins	1·8	1·8	2·0		
Coal	2·9	1·3	2·1		
Manufactures	—	*15·9*	*15·0*		
Textiles	9·1	7·2	6·3		
Iron and manufactures	2·5	2·5	3·2		
Chemicals and dyes	—	2·2	3·1		
Machinery and vehicles	—	2·0	1·6		
Total value in Rm. (thousand millions)	*9·14*	*12·42*	*4·84*		
Countries :					
United States	18·7	12·8	10·0		
United Kingdom	9·1	7·1	5·7		
Netherlands	4·6	6·1	5·5		
U.S.S.R.	1·4	2·9	5·0		
France	2·4	5·6	4·3		
Italy	4·0	3·6	4·1		
Argentina	5·7	5·7	3·5		
India	4·3	3·9	3·4		
Belgium and Luxembourg	1·7	3·6	3·3		
Czechoslovakia	4·8	3·9	3·2		
China	1·4	2·0	3·1		
Sweden	1·3	2·7	2·7		
Dutch East Indies	2·7	2·5	2·7		
Denmark	2·8	2·9	2·6		
Spain	1·2	1·7	2·3		
Switzerland	2·9	3·3	2·4		
Poland	4·4	2·5	1·3		
Australia	2·7	2·1	1·9		

Par exchange rate 1930 to September 21, 1931, 20·43 Reichsmarks to £1. 1932–35 approximately 12 Rm. = £1.

GERMANY

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*4·6*	*2·8*		
Raw materials	—	*20·6*	*26·3*		
Coal	0·9	4·8	4·7		
Coke	0·4	1·9	1·7		
Raw chemicals	—	2·8	1·9		
Fur skins	2·0	2·4	1·7		
Manufactures	—	*73·2*	*70·9*		
Iron and steel	12·2	13·8	15·1		
Machinery	7·1	8·0	9·4		
Chemicals, dyes, and paints	1·6 [1]	7·5	11·0		
Electro-technical appliances	3·9	4·1	5·0		
Paper and manufactures	5·0	3·6	4·0		
Leather and leather goods.	3·4	3·0	2·5		
Wool tissues	3·4	2·8	2·0		
Cotton tissues	·6·0	3·5	2·3		
Silk tissues	2·4	1·9	1·9		
Yarns	—	2·1	1·8		
Glassware	2·2	1·8	2·4		
Copper manufactures	1·5	2·7	2·6		
Watches, apparatus	—	2·2	2·1		
Total value in Rm. (thousand millions)	*6·53*	*11·62*	*5·73*		
Countries:					
Netherlands	9·9	10·4	10·9		
United Kingdom	9·3	10·3	9·2		
United States	7·5	6·8	4·5		
France	1·6	6·5	7·6		
Czechoslovakia	5·8	4·7	3·7		
Switzerland	5·7	4·7	6·6		
Italy	3·6	4·4	4·9		
Belgium and Luxembourg.	1·4	5·1	5·2		
Sweden	4·4	3·8	4·4		
Denmark	4·5	3·7	3·3		
Austria	4·8	3·2	2·7		
U.S.S.R.	1·4	3·0	5·4		
Poland	4·6	2·6	1·2		
Argentina	3·0	2·7	2·0		

[1] Coal tar dyes only.

For Towns of Germany, see page 421.

DANZIG

The Free City of Danzig, embracing the old German port of that name, together with the fertile and densely peopled delta of the Vistula, besides a small area on the west and half the Frisches Haff on the east, was created by the Treaty of Versailles. It carries on a trade similar to that of Königsberg. The provisions of the treaty under which it was founded gave large rights within it to the new republic of Poland, but were not sufficient to maintain Danzig in its old position as the main outlet and inlet for the Vistula basin. The rise of its new Polish rival Gdynia, before the War but a small fishing village, has been phenomenal. Danzig is within the Polish Customs Union, but is a Free City under the protection of the League of Nations. It does, of course, handle some of the exports of Poland, including Silesian coal, lumber, grain, and sugar. Danzig has long been famous for shipbuilding. The area of the Free City is 754 square miles and the population nearly half a million.

POLAND

The present Republic of Poland, embracing by far the greater part of the basin of the Vistula, was created by the Treaty of Versailles and comprises all the areas inhabited wholly or mainly by people of Polish speech belonging to Russia, Austria, and Prussia since the partitions of the former kingdom of Poland at the close of the eighteenth century. Of the former Russian empire it includes the Polish provinces with the addition of a district round Grodno, of Prussia the greater part of the provinces of Posen and West Prussia, of the former Austrian territory the north-western part of Galicia, thus extending in the south to the Carpathians from the neighbourhood of Przemysl westwards. Apart from these mountains the surface is for the most part composed of low plains. The whole country may indeed be divided into four unequal parts. In the extreme north-east and north-west there is a part of the Baltic lake country; occupying a broad strip from east to west is the glaciated plain comparable with the neighbouring plains of Germany; a short distance south of Warsaw begin the Polish plateaus—low plateaus covered with fertile lœss soils. Finally, in the south are the foothills and lower slopes of the Carpathians. In places the plains are ill-drained and large marshy tracts result, of which the Pripet marshes are the largest and most famous. The whole area contains a large proportion of arable land, but this is especially true of the middle belts, where wheat, rye, and sugar-beet are largely cultivated. An extensive area round Poznan (Posen) on both sides of the Warta, but chiefly to the south, has

more than sixty per cent. of the surface under the plough. The north-west, however, has considerable tracts of poor land under coniferous forest. The south-west is important for its mines of coal, iron, zinc, silver-lead, and salt, and the south-east has rich oil wells. In pre-war Poland the coal-mines were found near the south-west frontier round Dombrovo, but an enormous addition to the coal resources of the new state was made when the Council of the League of Nations, in October 1921, awarded it the greater part of the Upper Silesian coal-field, which in 1913 produced nearly one-fourth of the coal raised in Germany. To the northern part of this transferred area belong also the zinc (calamine) and silver-lead deposits of the new Poland. The iron deposits, which are of minor importance, are in or near the Dombrovo coal-field, as well as scattered among the other deposits of the transferred area, partly, also, along with copper, in the Lysa Gora. The salt-mines are those of western Galicia—Wieliczka and Bochnia to the west of Krakow; and the oil wells belong to the eastern part of this province, the principal being those of Boryslaw and Drohobycz.

Besides raw produce, Poland turns out large quantities of manufactured goods. Its extensive forests not merely furnish timber, but also supply the material for the manufacture of wood pulp and paper. A variety of manufactures are carried on at its two chief Vistula towns of Warszawa or Warsaw, the present capital, and Krakow, a much earlier capital, as well as Poznan. But the chief seat of manufactures, especially of textiles, is Łodz, situated west-south-west of Warsaw. This town has grown with remarkable rapidity. The whole textile industry of Poland was due to a series of Government decrees of the years 1816 to 1833, which had the effect of settling there a number of German, principally Saxon and Silesian, artisans and industrialists, and the growth of Łodz is the result of these settlements. It is difficult to find any local advantages on the spot. Till shortly before the War none of the great lines of railway passed through it. It is 88 miles from Warsaw, and 22 miles by rail from the junction on the Warsaw-Vienna line, which was, before the War, on a different gauge; so that though this line passed through the Dombrovo coal-field, the procuring of coal thence, a distance of about 140 miles, involved a break of bulk. All the Polish railways are now, however, on the standard gauge. The area transferred from Upper Silesia includes the important industrial towns of Krolewska Huta (Königshütte), Katowice (Kattowitz), and Tarnowskie Góry (Tarnowitz), all with iron blast furnaces, the first two also with extensive zinc works, and the third with silver-lead refineries. They are all within easy reach of good coking coal.

Commerce has grown rapidly since the establishment of the new State. Its exports increased in amount from 620,000 metric tons in

1920 to 21,040,000 in 1929. Germany takes the lead in her trade, but the proportion has decreased greatly the last few years (1920–27). As suppliers of imports the United States, Great Britain, Austria, and Czechoslovakia come next to Germany, and among the countries to which exports are sent Great Britain and Austria follow Germany in order of importance. Notwithstanding the hold which Poland has on Danzig, she has spent much money on the establishment of the new port of Gdynia on her own territory.

TOWNS OF POLAND, 1931

Warsaw	1,225,000	Katowice	131,000
Łodz	639,000	Czestochowa	131,000
Lwow	316,000	Bydgoszcz	129,000
Poznan	260,000	Sosnowiec	119,000
Krakow	237,000	Lublin	115,000
Wilno	208,000		

POLAND

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*17·1*	*15·3*	*11·7*		
Fruit	3·4	1·4	3·2		
Coffee, tea, and cocoa	2·1	2·5	3·0		
Fish	2·4	2·3	2·3		
Flour and cereals	4·6	3·6	1·3		
Raw materials	*32·0*	*41·0*	*43·3*		
Cotton (raw and waste)	10·3	11·0	11·4		
Wool (raw)	8·4	6·4	8·6		
Tobacco	2·0	1·8	2·8		
Iron : pig, scrap, bar	0·9	2·0	2·7		
Ores	0·8	3·1	2·0		
Manufactures	*50·4*	*41·4*	*36·7*		
Chemicals and manures	1·8	6·5	7·0		
Electrical machinery	7·8	3·8	3·3		
Other machinery	2·7	7·3	4·7		
Piece goods	5·6	3·8	3·4 [1]		
Paper, and manfrs. of	1·1	3·1	3·0		
Iron manufactures	3·1	2·7	2·2		
Vehicles	—	2·9	2·1		
Leather	4·1	3·0	1·6		
Total value in 1,000 million zloty	*1·48*	*2·63*	*0·79*		
Countries:					
Germany	34·2	26·1	18·0		
United Kingdom	7·5	9·1	10·0		
United States	12·5	13·7	13·1		
France	4·9	7·2	6·4		
Czechoslovakia	5·7	6·4	4·9		
Austria	11·7	6·3	4·6		
Italy	5·0	3·2	3·7		
Netherlands	1·7	4·0	3·4		
India	—	3·0 [2]	3·2		
Belgium	—	2·3 [2]	3·2		
Switzerland	1·6	2·8	3·8		
Australia	—	1·4 [2]	2·5		
U.S.S.R.	0·3	1·8	2·3		
Sweden	—	1·9 [2]	2·1		

[1] Figures not strictly comparable owing to alteration of classification.
[2] For years 1928–30 only.

Par rate of exchange prior to September 21, 1931, 43·38 zloty = £1; 1932–35 approximately 25 zloty.

POLAND

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35	—	—
Live animals	*3·7*	*7·5*	*3·2*		
Pigs	—	6·2	1·9		
Foodstuffs	*23·1*	*25·1*	*25·5*		
Meat and game	—	3·5	7·7		
Cereals and flours	5·5	4·8	10·0		
Eggs	—	5·8	3·1		
Sugar	12·9	5·2	2·4		
Raw materials	*46·1*	*51·3*	*43·0*		
Coal, coke, and briquettes	20·9	15·3	17·9		
Semi-manuf. wood	7·3	10·5	9·7		
Timber	1·7	7·0	7·3		
Zinc	5·8 [1]	5·7	3·0		
Plants and seeds	—	2·4	2·5		
Animal raw materials	1·7	1·9	2·2 [2]		
Manufactures	*27·1*	*16·6*	*21·5*		
Rails and iron manufrs.	3·4	2·2	4·6		
Wood manufactures	1·9	1·7	2·5		
Woollen yarn	1·5	1·7	1·7		
Woollen and cotton piece goods	8·5	2·4	1·6		
Total value in 1,000 million zloty	*1·27*	*2·50*	*1·17*		
Countries:					
United Kingdom	10·5	12·1	18·4		
Germany	42·4	29·7	16·4		
Austria	10·1	10·7	7·1		
Czechoslovakia	7·9	8·4	6·4		
Sweden	—	4·3 [3]	5·1		
Netherlands	3·1	3·2	4·4		
U.S.S.R.	0·9	2·7	3·9		
France	4·1	3·5	4·9		
Belgium	—	2·4 [3]	5·1		
Denmark	—	4·0 [3]	3·6		
Roumania	6·2	2·6	1·6		

[1] Includes tin and lead too.
[2] Figures not strictly comparable owing to alteration in classification.
[3] For years 1928–30 only.

For Towns of Poland, see page 428.

SWITZERLAND

The two states of Switzerland and Austria embrace the greater part of central Europe covered by the Alps, although neither of them is confined to the area so occupied. An important feature of both, however, is that they are traversed by the ancient routes, now in some cases followed by railways, connecting the most densely peopled areas of north central Europe with the most populous of the Mediterranean peninsulas.

From a commercial point of view the little country of Switzerland is in some respects very remarkable. With little coal and little iron, it is pre-eminently a manufacturing country in the modern sense of the term, manufactured articles forming the bulk of its exports, raw materials and food supplying the bulk of its imports. Situated in the heart of Europe, it sends its silks and cottons and its watches to the United States and South America, and the Far East, as well as to its immediate neighbours Germany, France, and Italy. Even to the United Kingdom it has managed in recent years to export artificial silks, silks, and fine cottons (chiefly embroideries of one kind or another) to the value of over a million sterling.

A land of mountains, a land in which five-sevenths of the surface is divided between the Alps and the Jura, it has a population as dense, on the whole, as that of Ireland, and there is not a single district in the most mountainous canton in which the density of population is as low as in the county of Sutherland.

The nature of the surface presents great obstacles to internal communication between the populous midland tracts and various parts of the more sparsely peopled region, and also to communication with the frontier countries in the east and south. Not till the nineteenth century was there any carriage-road across the Alps, but now the Swiss Alps possess some of the finest mountain roads in the world. The first constructed was that made by Napoleon across the Simplon for the passage of his 'cannon' from the valley of the upper Rhone to the banks of Lake Maggiore in Italy. This was completed in 1805, and by the year 1830 the road across the St. Gotthard between the valleys of the Reuss and Ticino, and those across the Bernardino, Splügen, Maloja, and Julier passes had been added. Of those subsequently constructed, the most important

perhaps are the Albula and Bernina pass-roads. The St. Gotthard road, for a long time the most important of all on account of the direct communication which it establishes between the most populous parts of Italy (with Milan as the chief centre), Switzerland, and Germany, was later largely superseded by the railway which pierces the St. Gotthard group in a tunnel nearly ten miles in length, (completed in 1882). By means of this railway the continental ports on the North Sea were brought to within a distance of three days for goods traffic from ports on the Mediterranean. The Bernardino, Splügen, Julier, Albula, and Maloja passes all serve to bring the Rhine valley by way of Coire (or Chur) into connection with Milan, the first by way of a tributary valley of the Ticino, the others by way of Chiavenna (the 'key town,' from Latin *clavis*, a key), the east side of Lake Como and the bridge of Lecco ; but the Splügen is the only one that leads direct to Chiavenna, the Julier and Albula leading first into the Engadine across the Maloja and thence to that town. Till 1903 the St. Gotthard was the only one of the great Alpine tunnels constructed within Swiss territory, but in that year a tunnel, $4\frac{1}{3}$ miles long, under the Albula pass, leading from Coire to the Engadine, was opened ; and another $12\frac{1}{4}$ miles long, under the Simplon (Brig to Iselle), was opened for general traffic on June 1, 1906. A second Simplon tunnel, begun in 1912, was opened December 4, 1921. The Simplon tunnel has much easier gradients in its approaches than either the St. Gotthard or the Mount Cenis tunnel. Its highest point is only about 2,300 feet above sea-level, or 1,070 feet above the Lake of Geneva, while the summit of the St. Gotthard tunnel is 3,785 feet above sea-level (2,350 feet above the Lake of Lucerne). It reduces the distance between Milan and Paris to 519 miles as compared with 559 miles by the St. Gotthard route. The Lötschberg tunnel, 9 miles long, through the Bernese Alps, connecting the Lötschental, which opens on the Rhone valley a little below Brig, with the Kandertal and Thun, completed in 1913, has greatly shortened the Simplon route to the north of France and brought Berne directly on to the main route. In order to facilitate the communication with Basel and the Rhine valley for both the St. Gotthard and Simplon routes a tunnel, opened in July 1914, has been pierced at base level through the Hauenstein to the north-west of Olten, to replace a previous tunnel at a higher level.

The climate of the Swiss midlands allows the same crops being grown as in the adjoining parts of France and Germany. Wine is produced most abundantly and best in quality in the south-west (Vaud and Neuchâtel). On the whole, however, the moistness of the climate, due to the mountainous character of the country, together with the exposure to moisture-bearing winds on both slopes of the mountains, causes Switzerland to be better adapted for pasture-

grasses than for the growing of food-crops, wine, and fruits. Of the total area, exclusive of waste land and forests, about 70 per cent. is used for cattle-rearing, less than 20 per cent. for the growing of cereals, less than 10 per cent. for potatoes, mangolds, and industrial plants, and only about 0·7 per cent. is under the vine. Hence, among the industries of this class, cattle-rearing alone yields a considerable surplus for export. Besides cheese and condensed and dried milk, there is an export of breeding stock belonging to races of cattle for which Switzerland has a high reputation, as well as of cattle for fattening, but this is partly balanced by an import of fat cattle, chiefly from Italy and Germany. When one takes into consideration the requirements of the large manufacturing population, as well as that arising from the attractions of Switzerland as a holiday resort, it will be seen that the country must be dependent to a large extent on imported cereals. In pre-War times much of this import was derived from Russia by way either of Marseilles and Geneva or Genoa and the St. Gotthard, but the bulk of the wheat and other cereals is now obtained from Canada and the Argentine.

Among mineral products, asphalt and cement are produced; salt is worked at Bex in the canton of Vaud, above the Lake of Geneva, and elsewhere. A small quantity of iron ore and manganese ore is worked in the Gonzen mine (St. Gallen).

For the prosecution of its **manufacturing industries** and handicrafts Switzerland, though suffering from the disadvantages above indicated, has certain advantages of its own, the principal being the abundance of water-power and of skilled labour, to keep up the quality of which the government has done so much in the way of providing for efficient technical education. To these may be added the advantageous commercial position of Switzerland, more particularly of northern Switzerland, which lies at the intersection of the great routes connecting northern Italy with the middle Rhine valley and the lower Rhone valley with that of the upper Danube; but this advantage is diminished by the smallness of the home market. Now that production on a large scale is of so great economic importance, it is adverse to Swiss industries that a customs barrier is encountered on all sides within so short a radius. The Swiss have taken a leading part in the development of their water-power by means of electricity (developed from 1894 onwards at Geneva, on the Rhone between the Lake of Constance and Basel at Schaffhausen, Neuhausen and Rheinfelden, at Brugg on the Aar and Baden on the Limmat, at Berne and elsewhere). In 1918 the amount of potentially available water-power in Switzerland was estimated at 4,000,000 horse-power, of which about one-fifth was utilised. Now 2½ million horse-power is developed, and most of the factories are electrically run, while all the 3,200 miles of railway

have been or are being electrified. The manufactures and handicrafts in which Switzerland particularly excels are those in which the value of the labour, or the whole cost of elaborating the raw material, is high in proportion to that of the material itself. Almost every branch of the machinery industry is carried on, but more particularly the manufacture of textile machinery, electrical machinery (at Oerlikon near Zürich and Baden), and hydraulic machinery. All the leading places engaged in this industry are in the commercially favoured northern district above indicated. The value of Swiss exports under the head of machinery and locomotives in 1911 was already double that of the imports ; in 1935 this proportion was still maintained.

The success of this country in the silk industry was largely owing to the dexterity with which cheaper materials, principally cotton, were worked up along with the more costly silk, which, moreover, is one of the raw materials the supply of which was greatly cheapened through the construction of the St. Gotthard railway leading direct to the great silk market of Italy. In cotton-spinning, Switzerland produces a greater quantity of fine yarn in proportion to the number of its spindles than any other country except England, and the cotton fabrics for which it is chiefly celebrated are trimmings and embroideries. These early successes clearly paved the way for the now very important artificial silk industry. Swiss shoes, which are exported to many parts of the world, are not the commoner sorts, but noted for their quality and finish combined with cheapness.

The chief centres of the silk industries of Switzerland are Zürich and Basel. The cotton manufactures are mainly carried on in the north-east, in Zürich and the adjoining cantons, but there are numerous bleaching, dyeing, and printing establishments in the canton of Glarus, in some of the deepest Alpine valleys. Machine embroidery and lace-work are pursued chiefly in the cantons of St. Gallen, Appenzell, and Thurgau. St. Gallen, which has been noted for its hand embroideries (mostly on linen), as well as its linen manufactures, since the thirteenth century, is now the centre of the industry not merely in Switzerland, but also in the neighbouring parts of Austria (Vorarlberg), in the little Principality of Liechtenstein, and Germany (Bavaria), where similar conditions prevail, small peasant farmers and their families supplying much of the labour and recruiting in the industry labour for their farms in the harvest time. The embroidery machine was introduced into St. Gallen in 1840, and it is since then that the industry, which is still, however, partly domestic, has grown to its present magnitude. The variety and richness of the patterns were enhanced through the introduction of the sewing-machine about a quarter of a century later. Watchmaking is principally carried on in the Swiss Jura, where it has been practised since the beginning of the eighteenth century, and where,

there is a high degree of hereditary skill now combined with the most advanced organisation. Formerly hand labour was exclusively employed in Swiss watch-making, but the keenness of foreign competition led to the establishment of factories with the necessary mechanical appliances. The chief seats of the industry are Le Locle and La Chaux de Fonds in Neuchâtel, Bienne, St. Imier, and Porrentruy in Berne, Grenchen in Solothurn and at Geneva, which is one of the chief centres of the trade in this article. The manufacture of chemical products, especially aniline dyes and drugs, is important at Basel, and in recent years the water-power of Switzerland has been made use of in the manufacture of aluminium (at Rheinfelden) and carbide of calcium.

The capital of the republic is Berne, on the river Aar, but, as is shown below, the most populous towns are Zürich, Basel, and Geneva. These also have the most commanding situations commercially—Basel, on the German frontier at the head of the plain of the middle Rhine; Zürich, the centre of the highly populous region, and a place of convergence of railways of great importance since the construction of the St. Gotthard line, which runs thence southwards, and the eastern line through the Arlberg tunnel. Geneva, in the narrow opening formed by the Rhone valley between the Alps and the Jura, has the best situation in relation to Marseilles.

The central situation of Switzerland is one of the facts that have caused this country to be selected for the seat of several semi-official international bureaux of great importance for commerce and industry, viz. the United Telegraph Administration, the International Postal Union, the Railway Administration, the headquarters of the League of Nations at Geneva, the International Labour Office, and the unions for the protection of trade marks and patents and of literary and artistic property.

In transmarine commerce the chief North Sea port made use of by Switzerland is Antwerp, especially in the case of the export trade, which is mainly in relatively valuable articles, for which inland water carriage is unsuited. For much of the imported grain, however, Rotterdam is the port and Mannheim the distributing centre, though the recent improvements of the Rhine enable much of it now to reach Basel direct in the high-water season. Havre and other French ports are the chief places of export of Swiss silks and watches, and Havre is the chief importer for Switzerland of raw cotton, though it has a rival in this trade in Bremen. Hamburg is the chief Swiss port for Central and South America, St. Nazaire and Bordeaux coming next. For the Baltic trade the chief port, as is natural, is Lübeck. For the trade of the Mediterranean and all that passes through the Mediterranean, including South American grain, Marseilles is the chief port, but for the Far Eastern trade it has a rival in Genoa. From the returns of the consignment trade

SWITZERLAND

SPECIAL IMPORTS,[1] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Million Sterling. 1886–90	'96–00	'06–10	'11–13	'25–29[12]	Percentages of Total Value. '86–90	'96–00	'06–10	'11–13	'25–29
1. Silk, raw and spun	4·82	5·03	6·57	6·54	7·98	13·8	10·8	9·9	8·7	7·7
2. Wheat	2·66	3·06	3·79	4·80	5·71	7·6	6·6	5·7	6·4	5·5
3. Iron and steel	0·80	1·63	2·19	3·59	3·29[4]	2·3	3·5	3·3	4·7	3·3[4]
4. Coal, coke, &c.	0·97	2·11	3·55	3·97	5·41	2·8	4·5	5·4	5·2	5·2
5. Animals, living	1·94	1·97	2·50	2·75	0·61	5·5	4·2	3·8	3·6	0·6
6. Cottons[3]	1·04	1·09	2·05	4·96	4·20	3·0	2·3	3·1	6·5	4·0
7. Raw cotton	1·48	1·12	1·82	2·15	3·91	4·2	2·4	2·8	2·8	3·7
8. Wearing apparel[3]	0·85	0·94	1·68	2·23	—	2·4	2·0	2·6	2·9	—
9. Machinery, locomotives	0·44	0·92	1·65	1·97	3·27	1·2	2·0	2·5	2·6	3·1
10. Woollens[3]	1·63	1·43	1·57	3·04	4·63	4·6	3·1	2·4	4·0	4·4
11. Iron and steel manufactrs.	0·51	1·02	1·41	1·90	2·14	1·5	2·2	2·1	2·5	2·1
12. Wine	1·12	1·31	1·40	2·01	2·56	3·2	2·8	2·1	2·6	2·5
Average total value	35·02	46·57	66·04	76·10	104·28					

Principal Countries.	Percentages. '86–90	'96–00	'06–10	'11–13	'25–29
1. Germany	30·7	28·1	32·2	32·6	21·2
2. France	25·9	23·4	20·7	18·6	18·7
3. Italy	14·2	14·5	12·5	10·2	8·8
4. Austria-Hungary	11·1	6·5	6·2	6·0	—
5. United Kingdom	5·5	4·7	6·0	5·8	7·7
6. Russia in Europe	2·7	5·1	4·4	4·2	0·3
7. United States	2·9	4·9	3·9	4·8	8·9
8. Belgium	3·2	2·3	2·0	2·0	3·2
9. Bulgaria, Roumania and Servia	0·4	1·1	1·8	1·9	1·1[10]
10. Egypt	1·4	1·2	1·4	1·4	2·2

SPECIAL EXPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Million Sterling. 1886–90	'96–00	'06–10	'11–13	'25–29[12]	Percentages of Total Value. '86–90	'96–00	'06–10	'11–13	'25–29
1. Ribbons, embroidery, lace	3·43	3·53	6·88	10·12	4·22[5]	12·4	11·0	15·1	19·2	5·2
2. Silks[3]	4·79	5·62	6·30	10·06	12·20	17·4	17·5	13·8	18·9	15·2
3. Watches, clocks, &c.	3·52	4·29	5·62	6·43	11·13	12·8	13·3	12·3	12·1	13·8
4. Silk, raw and spun	3·11	2·95	4·20	4·22	1·90[6]	11·3	9·2	9·2	7·9	2·4[6]
5. Machinery, locomotives	0·79	1·52	2·83	3·66	8·05	2·9	4·7	6·2	6·9	10·0
6. Cheese	1·54	1·60	2·23	2·64	3·93	5·6	5·0	4·9	5·0	4·9
7. Cotton piece goods[3]	1·98	1·37	1·80	1·19	4·30	7·2	4·3	3·3	2·2	5·3
8. Condensed milk	0·47	0·84	1·18	1·73	1·66	1·7	2·6	2·6	3·3	2·1
9. Coal tar dyes	0·30	0·63	0·90	1·12	3·02[7]	1·1	2·0	2·0	2·1	3·8[7]
10. Wool yarn and tissues[3]	0·57	0·60	0·79	0·75	2·11	2·1	1·9	1·7	1·4	2·6
11. Hides and skins, raw	0·29	0·39	0·74	1·61	0·85	1·0	1·2	1·6	3·0	1·1
12. Cotton yarn	0·88	0·72	0·60	0·68	2·19	3·2	2·2	1·3	1·3	2·7
Average total value	27·60	32·14	45·71	53·21	80·46					

Principal Countries.	Percentages. '86–90	'96–00	'06–10	'11–13	'25–29
1. Germany	21·8	21·4	23·7	22·2	17·5
2. United Kingdom	15·2	19·7	16·4	17·0	16·0
3. United States	12·0	10·0	12·2	10·4	10·0
4. France	20·2	16·5	12·2	10·3	7·9
5. Italy	8·1	5·5	7·4	6·5	6·2
6. Austria-Hungary	5·4	5·5	6·1	6·3	3·5[11]
7. Russia in Europe	1·6	3·4	3·0	3·9	0·2
8. Argentina,[9] Uruguay and Paraguay	1·1	0·9	2·0	2·7	1·8[8]
9. Belgium	1·6	1·6	1·8	2·0	2·0
10. Spain	1·3	1·5	1·6	2·0	3·0
11. British India	1·6	1·5	1·4	1·6	1·9

[1] In most cases 'official values' revised annually, but 'declared values' are permitted for objects of art, science, silks, &c. [2] 'Declared values.' [3] After 1891 hosiery is included under apparel and not under cotton, silk, or wool manufactures as formerly. [4] This represents unmanufactured iron and steel. [5] Cotton embroidery. [6] Silk and artificial silk, raw. [7] Total dyes. [8] 1925–29 Argentina only. [9] Figures for 1911–13 are for Argentina and the rest of South America except Brazil, Columbia, and Chile. [10] Roumania and Yugoslavia. [11] Austria only. [12] Exchange 25·2 fr. = £.

SWITZERLAND

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Foodstuffs	—	*25·9*	*18·6*		
Fruit and vegetables. .	—	3·4	4·7		
Wheat	4·6	5·2	4·0		
Other cereals . . .	3·9	3·5	3·5		
Wine	2·5	1·9	1·5		
Sugar	3·4	2·4	2·5		
Raw materials . . .	—	*27·6*	*18·5*		
Coal and coke . .	6·1	5·3	7·0		
Iron (raw and semi-manuf.)	3·0	3·3	3·4		
Other metals (raw and semi-manufactured) .	—	2·6	2·0		
Mineral oils . . .	—	1·8	2·2		
Cotton (raw and waste) .	5·4	3·3	1·9		
Silk and artificial silk (raw)	8·6	5·0	1·4		
Manufactures	—	*41·4*	*31·5*		
Wool, yarn, and manufrs..	4·3	4·4	4·6		
Machinery and parts .	2·1	3·3	3·9		
Cotton yarns and manufrs.	5·5	3·7	3·6		
Silk and artificial silk .	1·5	2·2	3·4		
Vehicles	2·5	3·1	3·3		
Chemicals	5·6	2·5	2·5		
Instruments and apparatus	—	1·8	2·2		
Leather, and manufrs. of .	1·7	2·2	2·0		
Total value in 1,000 million francs . .	*2·50*	*2·64*	*1·66*		
Countries:					
Germany	19·4	18·7	22·2		
France	18·1	18·3	12·8		
Italy	11·5	8·1	6·3		
United States . . .	8·3	10·7	4·9		
United Kingdom . .	7·4	7·3	4·2		
Argentina	3·5	3·0	3·0		
Belgium	3·4	3·2	2·8		
Czechoslovakia . .	3·3	3·2	2·6		
Netherlands . . .	1·7	2·1	2·1		
Canada	2·9	3·4	1·4		
Egypt	2·7	2·0	0·9		

Par rate of exchange prior to September 21, 1931, 25·225 francs = £1; 1932–35 approximately 15 francs = £1.

of the United Kingdom we now learn that Switzerland exports to this country a large value of silk and artificial silk manufactures, of embroidery and needlework, watches, condensed milk, shoes,

SWITZERLAND

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*10·0*	*7·2*		
Cheese	4·0	5·1	5·0		
Condensed milk	1·7	2·0	1·2		
Raw materials	—	*9·4*	*7·4*		
Aluminium (raw and semi-manufactured)	2·3	2·0	1·6		
Other metals	—	2·0	1·7		
Manufactures	—	*76·9*	*57·2*		
Watches and parts	13·2	13·7	12·2		
Cotton yarns	18·9	2·5	2·2		
„ piece goods		5·0	6·4		
„ embroideries		5·1	1·9		
Silk piece goods	18·1	8·9	4·6		
Other silk manufactures		5·1	3·6		
Woollen yarn and manufs.	2·8	2·6	1·9		
Textile machinery	7·8	2·5	2·6		
Other machinery		8·2	8·9		
Dyes, colours, paints	1·0	4·0	7·3		
Instruments and apparatus	—	3·0	3·5		
Straw manufactures	1·3	2·2	2·4		
Iron manufactures	1·4	1·8	2·1		
Total value in 1,000 million francs	*2·07*	*1·98*	*0·93*		
Countries:					
Germany	15·8	17·1	19·4		
France	10·0	8·3	14·6		
United Kingdom	19·1	14·9	10·4		
United States	9·9	9·7	6·4		
Italy	4·6	6·5	8·9		
Netherlands	2·1	2·7	4·0		
Austria	4·3	3·5	2·9		
Belgium	2·2	2·2	2·9		
Czechoslovakia	1·8	2·5	2·9		
Spain	2·5	3·0	2·5		
Japan	3·2	2·4	1·5		

coal-tar dyes, and electrical goods, and receives from this country unbleached cottons, cotton thread and yarn, woollen and worsted goods, woolwork, and a great variety of other articles.

The value of the imports greatly exceeds that of the exports, but against this must be set the huge value of the tourist traffic. Switzer-

land has a winter season for winter sports, with numerous hotels at elevated situations (*cf.* St. Moritz and Pontresina in the Engadine, and Davos). There is also the summer season, when the lakeside resorts are especially popular ; 50,000 people are employed in the hotel industry alone.

TOWNS OF SWITZERLAND, 1930

Zürich	250,000	Berne	112,000
Basel (Bâle)	150,000	Lausanne	76,000
Geneva	143,000	St. Gallen	64,000

AUSTRIA

Of all the states carved out of or largely made up of territory formerly belonging to the Austro-Hungarian Monarchy, this is the one in which on the whole most respect has been paid to natural boundaries. The northern boundary is with slight deviations that which separated the archduchies of Upper and Lower Austria from Bohemia, and that between Germany and the Tirol. The western is the former boundary with Switzerland as far as the Reschen-scheideck. The new southern boundary cuts off to the south a considerable Alpine territory known as the Trentino, the northern part of which is German in speech, while the southern part has long been Italian. On the eastern side the boundary is mainly artificial and has been pushed a little eastwards beyond the former Hungarian boundary, so as to include a strip in which the inhabitants are mainly German in language.

The directness of the Brenner route, which runs with comparatively slight deviations from north to south between Innsbruck and Verona, and enables the whole width of the Alps to be crossed by means of a single pass under 4,500 feet in height, would at all times have given it a high degree of importance it if had always been available. It was certainly used in prehistoric times in the trade in Etruscan bronzes and earthenware and Baltic amber. It was one of the passes across which the Romans made a trans-alpine road. In the Middle Ages, however, it got obstructed by landslips in the narrow gorge of the Isarco above Bolzano, and was long in part neglected down to 1480, when it was again made practicable for wheeled vehicles. Even during this period, however, the route was not wholly abandoned. The obstructed portion was avoided, and the Brenner route joined again, sometimes from the east by way of the Val Pusteria (Pustertal), sometimes from the west by ascending the valley of the Adige as high as Merano, and thence going north-east across the Jaufen Pass, which rises, however, to nearly 6,900

feet, and involves a descent to about 3,100 feet before the Brenner is crossed. Frequently the Brenner route was avoided altogether; the valley of the Adige was ascended to its head in the west of the Tirol, and the Inn valley was then reached by the Reschenscheideck, which is under 4,900 feet. In this case Augsburg was reached by the Fern Pass (4,100 feet), a little to the west of Seefeld. From 1480 the Brenner route has been used continuously. A modern carriage road, made across it in 1772, was the first of its kind made across the Alps, and the railway across it, completed in 1867, was the first of the great trans-alpine railways; the longest tunnel on this line, more than half a mile in length, is in the side of a mountain to the south of Brenner. It is noteworthy that the three most populous towns in the former crown-land of the Tirol, Innsbruck, Bolzano (Bozen), and Trento (Trent), are all on this route.

Agriculture is carried on more extensively in the Danubian tracts of Upper and Lower Austria than elsewhere, these parts having the only considerable areas suited to wheat and maize as well as coarser cereals. The Alpine provinces are predominantly engaged in forestry, together with the cultivation of rye and oats and the rearing of cattle, which is here carried on as in Switzerland. The forests are mainly in the hands of small owners.

The chief minerals are iron ore, lignite, lead, zinc and copper ores, and salt. True coal is almost entirely wanting, though five anthracite mines obtain almost a quarter of a million tons a year. But lignite abounds among the more recent tertiary rocks in the east of the Alps, and especially in the Styrian valley of Kainach, which opens from the right into that of the Mur below Graz. In northern Styria, at Eisenerz, a little to the south-east of the northerly bend of the Enns, on the north side, and at Vordernberg, on the south side of the Erzberg, are the chief Austrian iron-ore workings. The Erzberg, that is, 'Ore-mountain,' situated at this place, is almost one entire mass of an iron carbonate, and the ore, which has been mined for 2,000 years, is obtained from open-air quarries. More valuable kinds of iron ore (limonite and siderite) are obtained from the Hüttenberg Erzberg, in the north-east of the neighbouring province of Carinthia, which ranks next to Styria in iron-ore production. Salt is abundant in the Salzkammergut, in the south-west of Upper Austria, at Hall in northern Tirol (below Innsbruck), and at Hallein in Salzburg, above the town of Salzburg. Extensive deposits of china clay have been found half-way between Linz and Passau. Austria has large resources of water-power, but they have not yet been as fully developed as in Switzerland.

The working of iron and steel in all forms is chiefly carried on at two places, one Steyr, in Upper Austria, which is in direct railway communication, chiefly by the valley of the Enns, with Eisenerz, and the other, Donawitz, close to Leoben, at the mouth of the

AUSTRIA-HUNGARY[1]

SPECIAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.								Percentages of Total Value.							
	1876–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13
1. Raw cotton	3·07	3·98	4·56	4·20	4·83	7·67	11·07	13·60	6·6	7·7	9·6	7·6	7·4	9·7	10·3	9·6
2. Coal and coke, excluding lignite	—	—	1·48	2·35	3·51	4·30	7·13	9·34	—	—	3·1	4·2	5·4	5·5	6·7	6·6
3. Raw wool, from 1879	2·93	3·02	3·32	3·05	3·82	4·84	6·29	6·25	6·0	5·8	7·0	5·5	5·8	6·1	5·9	4·4
4. Machinery and locomotives	0·70	1·31	1·23	1·68	1·86	2·09	4·59	4·60	1·5	2·5	2·6	3·0	2·8	2·7	4·3	3·3
5. Hides and skins, raw	1·44	1·78	1·29	1·71	1·73	2·20	3·24	4·53	3·1	3·4	2·7	3·1	2·6	2·8	3·0	3·2
6. Leather and leather wares	1·64	1·59	1·30	1·55	1·91	2·10	2·86	3·78	3·5	3·0	2·7	2·8	2·9	2·7	2·7	2·7
7. Flax, hemp, and jute, raw	1·06	1·30	1·33	1·50	1·62	2·01	2·59	3·52	2·3	2·5	2·8	2·7	2·5	2·6	2·4	2·5
8. Coffee	2·61	2·37	2·84	3·12	2·09	1·85	2·40	4·00	5·5	4·6	6·0	5·6	3·2	2·3	2·2	2·8
9. Silk and floss silk	—	—	—	1·47	1·53	1·83	2·33	2·56	—	—	—	2·7	2·3	2·3	2·2	1·8
10. Books and printed matter	—	—	—	1·31	1·55	1·98	2·28	2·31	—	—	—	2·4	2·4	2·5	2·1	1·6
11. Wool yarn	1·00	1·15	1·40	1·69	1·66	1·54	2·19	2·18	2·1	2·2	3·0	3·0	2·5	2·0	2·0	1·5
12. Raw copper, from 1878	0·22	0·36	0·32	0·54	1·05	1·32	2·11	2·76	0·5	0·7	0·7	1·0	1·6	1·7	2·0	2·0
13. Silk manufactures	1·31	1·30	0·99	1·07	1·32	1·30	2·09	2·39	2·8	2·5	2·1	1·9	2·0	1·7	2·0	1·7
20. Animals, other than horses	2·29	1·39	0·89	1·08	0·94	1·48	0·24	1·56	4·9	2·7	1·9	1·9	1·1	1·9	0·2	1·2
Average total value	46·86	51·52	47·35	55·49	65·56	78·70	107·00	141·01								

SPECIAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	1876–80	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'76–80	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13
1. Wood and manufactures thereof	—	—	—	6·64	10·12	11·59	13·54	14.99	—	—	—	10·4	14·2	13·6	13·7	13·7
Manufactured	*1·06*	*1·43*	*1·38*	*1·54*	*1·79*	*1·95*	*2·97*	*3·51*	*1·9*	*2·3*	*2·3*	*2·4*	*2·5*	*2·3*	*3·0*	*3·2*
Half-manufactured	—	—	—	*3·18*	*4·70*	*5·50*	*6·94*	*11·48*	—	—	—	*5·0*	*6·6*	*6·4*	*7·0*	*10·5*
Unmanufactured	—	—	—	*1·92*	*3·63*	*4·14*	*3·62*		—	—	—	*3·0*	*5·1*	*4·8*	*3·7*	
2. Sugar and molasses	3·88	5·37	4·55	6·51	6·39	6·86	9·16	10·60	7·1	8·9	7·5	10·1	9·0	8·0	9·3	9·7
3. Eggs	—	0·55	1·08	2·34	3·60	4·32	4·67	5·47	—	0·9	1·8	3·6	5·1	5·1	4·7	5·0
4. Lignite (and coal)	—	1·16	1·99	2·46	2·98	3·41	4·06	3·69	—	1·9	3·3	3·8	4·2	4·0	4·1	3·4
5. Glassware	—	—	1·45	1·63	1·99	2·22	2·99	3·29	—	—	2·4	2·5	2·8	2·6	3·0	3·0
6. Woollens	1·99	2·25	2·09	1·48	1·66	2·19	2·81	2·85	3·6	3·7	3·4	2·3	2·6	2·6	2·9	2·6
7. Hides and skins, raw	0·69	0·98	0·77	1·18	1·46	2·01	2·76	3·44	1·2	1·6	1·3	1·8	2·1	2·3	2·8	3·1
8. Animals, other than horses	4·24	3·60	2·51	3·75	2·16	3·93	2·59	1·37	7·8	6·0	4·1	5·8	3·0	4·6	2·6	1·2
9. Cotton manufactures	0·56	0·72	0·59	0·52	0·59	1·00	2·26	3·16	1·0	1·2	1·0	0·8	0·8	1·2	2·3	2·9
10. Malt, from 1878	0·73	1·01	1·37	1·48	2·00	2·09	2·20	2·49	1·3	1·7	2·3	2·3	2·8	2·4	2·2	2·3
11. Leather manufactures	—	—	1·84	2·54	2·39	2·12	2·05	2·30	—	—	3·0	3·9	3·4	2·5	2·1	2·1
12. Paper, prepared and manufactured	—	—	—	1·04	1·18	1·41	1·81	1·75	—	—	—	1·6	1·7	1·7	1·8	1·6
15. Barley and wheat	5·74	4·61	4·84	3·58	2·89	2·83	1·59	1·42	10·5	7·6	8·0	5·6	4·1	3·3	1·6	1·3
Average total value	54·61	60·45	60·63	64·20	70·83	85·51	98·58	109·74								

[1] Prior to 1914. For post-War trade of succession states, see following pages.

valley leading from the Mur up to Vordernberg. Graz, in southern Styria, is a small expansion of the Mur valley, and Klagenfurt, the capital of Carinthia, and the nearest important town to the iron region of that province, both carry on iron along with other industries.

The one large town left to the new state of Austria is Vienna. Being situated at the base and partly upon the foot-hills of the Alps

AUSTRIA-HUNGARY

COUNTRIES OF ORIGIN AND DESTINATION

Countries of Origin of Imports.	Percentages.				
	1891–95.	1896–1900.	1901–05.	1906–10.	1911–13.
1. Germany	36·6	36·3	37·6	39·7	39·7
2. United States	4·4	7·7	8·6	8·9	9·5
3. United Kingdom	10·3	9·2	7·9	8·5	6·8
4. British East Indies	6·9	5·4	5·8	6·8	6·4
5. Russian Empire	5·2	6·5	5·9	6·0	6·3
6. Italy	6·7	7·1	5·8	4·8	4·7
7. France	3·5	3·3	3·4	3·5	3·4
8. Switzerland	3·5	3·2	2·8	2·9	2·5
9. Roumania	1·2	2·5	2·3	2·2	2·7
10. Brazil	4·1	2·7	2·3	2·1	2·0
11. Belgium	1·6	1·9	1·8	1·8	1·5
12. Turkish Empire	2·2	2·3	2·3	1·8	1·9
18. Serbia	2·5	2·3	3·0	0·7	1·0

Countries of Destination.	Percentages.				
	1891–95.	1896–1900.	1901–05.	1906–10.	1911–13.
1. Germany	53·4	52·3	50·8	46·2	42·6
2. United Kingdom	7·8	9·5	9·4	9·7	9·5
3. Italy	7·1	7·6	7·4	9·0	8·0
4. Turkish Empire	2·8	3·4	3·9	4·5	5·1
5. Roumania	3·5	3·3	3·2	4·2	4·7
6. Switzerland	4·9	4·0	3·8	4·0	4·3
7. Russian Empire	3·0	3·8	3·6	3·3	3·7
8. France	4·0	3·5	3·2	3·1	3·0
9. United States	1·7	2·0	2·1	3·0	2·4
10. British East Indies	0·8	1·8	2·6	2·6	2·7
11. Egypt	0·9	1·3	1·5	1·7	1·3
12. Netherlands	1·3	1·4	1·6	1·2	1·1
13. Bulgaria	1·2	0·8	1·0	1·1	1·4

at the east end of the narrow valley through which the Danube flows after leaving Germany, it is so situated as to cause all traffic between the Hungarian plains and southern Germany to converge on it, and the value of this position is enhanced by the comparatively easy routes to the Adriatic. The oldest and lowest of the trans-alpine railways, that by way of the Semmering Pass, leads to Venice, and a still shorter route connects it with Trieste. Such advantages were sure to maintain it as a great commercial and industrial centre, but after it ceased to be the capital of a great monarchy, the city lost much of the importance it formerly had and the population dropped from over two millions before the War to 1,865,000 in

1923. But the city has made the most of its central position and its reputation for manufactures of special character and high quality,

AUSTRIA

SPECIAL IMPORTS

—	Percentage of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Livestock	*6·9*	*8·5*	*7·9*		
Cattle and pigs	6·4	8·4	7·5		
Foodstuffs	*26·9*	*23·8*	*18·0*		
Cereals	6·6	6·7	9·1		
Flour	4·7	2·9	1·3		
Raw materials	*29·4*	*28·2*	*14·7*		
Coal, coke, &c.	8·3	7·4	9·2		
Seeds, hops, fodder	—	2·0	3·5		
Wool (raw)	2·4	2·5	3·5		
Cotton (raw and waste)	3·6	3·1	3·5		
Tobacco	3·1	2·0	2·7		
Metals (crude)	2·7	2·4	1·1		
Manufactures	*36·0*	*37·2*	*32·4*		
Chemicals, dyes, colours	1·2	2·5	4·0		
Yarns (wool, silk, cotton)	2·3	3·7	4·0		
Silk and part-silk manufrs.	4·7	4·2	3·4		
Cotton manufactures	9·3	5·4	3·1		
Wool manufactures	6·1	3·5	2·2		
Machinery	2·1	4·0	3·2		
Iron manufactures	1·5	2·8	2·5		
Total value in 1,000 million schillings	*3·47*	*3·01*	*1·41*		
Countries:					
Germany	14·9	18·9	18·9		
Czechoslovakia	22·4	18·4	14·4		
Hungary	11·6	10·4	10·3		
Yugoslavia	4·4	5·1	7·3		
Poland	7·5	8·8	7·0		
Roumania	2·5	4·7	5·7		
United States	5·5	6·0	5·0		
Italy	7·5	4·0	4·5		
Switzerland	5·7	4·6	3·6		
United Kingdom	3·1	2·3	3·2		
France	2·3	2·6	2·6		

Par rate of exchange to September 21, 1931, 34·585 schillings = £1; 1932–35 approximately 25 schillings.

and has regained for itself a position of pre-eminence. Before the War its manufactures included silks, machinery, bentwood furniture, fancy wares, and many others; now clothing has become the leading industry and therein Vienna rivals Paris as a dictator of women's fashions.

AUSTRIA

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*2·3*	*2·2*	*2·9*		
Raw materials	*18·1*	*22·3*	*23·9*		
Timber	7·1	9·9	8·8		
Cement, bricks, minerals	0·7	2·4	3·3		
Bar iron	1·3	2·1	2·7		
Leather and leather goods	5·1	4·3	2·9		
Manufactures	*77·9*	*72·2*	*69·4*		
Paper, and manufrs. of	6·6	8·1	11·1		
Iron, and manufrs. of	5·3	5·9	6·3		
Other metals, and manufrs. of	3·9	4·2	4·0		
Wool manufactures	—	5·0	5·4		
Cotton yarns	5·0	3·6	3·2		
Cotton embroideries and lace	4·6	3·4	2·3		
Other cotton manufrs.	3·3	3·0	1·9		
Silk yarns	2·5	2·5	1·4		
Silk and part silk manufrs.	2·2	4·6	1·8		
Apparel (excluding hats)	2·6	1·8	2·2		
Machinery	3·4	3·8	3·1		
Electrical machinery	3·3	3·5	4·3		
Works of art and books	1·1	1·5	2·6		
Rubber, and manufrs. of	3·6	1·9	2·1		
Wooden ware	3·6	2·1	1·4		
Total value in 1,000 million schillings	*1·99*	*1·99*	*0·92*		
Countries:					
Germany	13·1	16·4	15·7		
Italy	10·1	8·9	10·9		
Hungary	8·7	8·5	9·7		
Czechoslovakia	10·9	12·4	8·9		
Switzerland	6·6	5·9	7·3		
Yugoslavia	10·3	8·0	6·9		
United Kingdom	4·3	4·3	5·0		
Roumania	6·6	5·7	5·0		
France	2·5	3·1	4·1		
Netherlands	1·6	1·4	2·1		
United States	2·0	3·3	2·0		
Poland	9·8	4·8	3·8		

Towns in Austria, 1934

Vienna	1,874,000	Linz	109,000
Graz	153,000	Innsbruck	61,000

THE SUCCESSION STATES

The 'Succession States'—Austria, Czechoslovakia, Hungary, and Yugoslavia—have been largely carved out of the pre-War Austro-Hungarian Empire. They are frequently known as the Danube States in that they lie in the central basin of the Danube. In this connection may be added Roumania.[1]

This part of Europe is mountainous in the north, east, and south, partly also in the west, but these mountains enclose the great plains of the Danube, and the kingdom of Roumania also comprises broad plains outside of this mountain encirclement. These mountains still form barriers to communication, especially in the eastern half of the area. In the western half the provision of railway facilities was stimulated, as between opposite sides of the Pennines in England, by the great density of the population on both sides.

Down to recent times the Carpathian Mountains, separating Hungary and Transylvania from Galicia, Russia, and Roumania, had much longer intervals uncrossed by rail than the Alps, but this was not because they were more difficult to cross, but because the more populous regions on the opposite sides yield for the most part similar products, and the wide intervening belt yields little but timber.

A very important feature of the geography of this region is the easy access from the great Danubian plains to the most important valleys of the Balkan Peninsula. The approach to two valleys leading to the Aegean Sea is made by the Morava, a right-bank tributary of the Danube, joining the main stream a little below the confluence of the Save. A southern route continuing the ascent of this valley leads to a water-parting only 1,750 feet in height, and then down to Salonika by the railway route by the valley of the Vardar. Another route much used in the Middle Ages is by a more open and less dangerous route to the east through the basin of Shtip and by the valley of the Struma, but this route passes out of Yugoslavia, into Bulgaria, and then into Greece. From this route,

[1] The native spelling is Romania; modern usage in England tends to replace the old conventional Roumania by Rumania. Even the Permanent Committee on Geographical Names of the Royal Geographical Society has varied in its spelling of the name.

via Sofia, there is a pass 2,400 feet in height to the valley of the Maritsa, and so to Istanbul (Constantinople). These openings facilitated the movements of conquerors and settlers in opposite directions at different times. The settlers were mainly Slavs, who poured in from the eastern plains of Europe, and in the ninth century seemed likely to give rise to a great Slavonic empire extending from the Peloponnesus to the Baltic, minor valleys, tributary to the Danube, favouring their penetration in the north-west of the Balkan Peninsula. In the tenth century, however, this possibility was removed by the invasion of the interior Danubian plains by the Turanian horsemen, who founded the kingdom of Hungary, and formed a permanent separation between the northern and southern Slavs : the northern, now represented by the Czechs in the western and middle parts of Czechoslovakia, and the Slovaks in the east of the same state ; the southern by the Slovenes, Croatians, and Serbians in that order from west to east. The language of all three is the same, with small dialectical differences, and is more closely allied to the Ukrainian spoken in the south-west of Russia than to the Slavonic languages of the northern states. Though these southern Slavs, including the inhabitants of the Dalmatian coast, are now all united in the single state, conveniently and now officially known as Yugoslavia—it was officially called at first the kingdom of the Serbs, Croats, and Slovenes—they differ in religion, the Slovenians, Croatians, and Dalmatians being Roman Catholics, while the Serbians mostly belong to the Orthodox (Greek) Church, although a large proportion of them in Bosnia are Mohammedans.

The movement in the opposite direction by the openings mentioned was that of the Turks, but they were rather conquerors than settlers. The Mohammedans of Bosnia are the descendants of those who were induced by the temptation of special privileges to adopt that faith. But Turkish dominion at one time spread far north. By the end of the seventeenth century it extended over the plains of Hungary to within a short distance of Vienna, although not eastwards into the more mountainous tracts within the Carpathians. But in this region there is a great intermingling of population from other causes. Outside the Carpathian Mountains and the Transylvanian Alps, as that portion of this system which stretches east and west to the south of the tributaries of the Tisa (Theiss) is called, live a people speaking a language descended from the Latin and claiming descent from Roman settlers of the time of the Empire, a claim to which expression is given in the name of Romania, which they give to their country. But Romanians are not confined to this external area. They also form the bulk of the population in Transylvania, that is, the territory within the mountains above named. How they came to be there and how long they

have dwelt there is unknown, but it should be remembered that the territory on both sides of the mountains belonged to the ancient Roman province of Dacia. When we observe how gold-mines attract population to a region in which the settlers afterwards take to other occupations, it may be suggested as a possibility, but no more, that the Transylvanian Romanians are descendants of such a population attracted by the gold-mines of Aquincum, in the south-west of Transylvania. With the Romanians in Transylvania are intermingled a considerable proportion of Hungarians (Magyars), as a result of the long-continued Hungarian domination in this region, partly, it is conjectured, as the result of an early settlement made even before the period of domination. The Magyars, known as Szeklers in the south-east, where they form a more compact element of the population than elsewhere, are believed to be such a remnant. Both in Hungary and Transylvania are also to be found isolated colonies of German settlers, many of them formed on the invitation of the state. The Hungarians have a saying, 'The Magyars founded the state, the Germans built the cities.' Hence the frequent occurrence of the element Deutsch (German), Nemet (Magyar), Szasz (= Saxon), all meaning German, in place-names.

These racial and linguistic differences have had a great influence in the formation of the new states brought into being as the result of the War; and it is obvious that they must continue to create internal difficulties as well as tend to cause friction in the mutual relations of the states. Manifestly, too, the breaking up of a great Empire within which there was formerly free trade must place new obstacles in the way of commercial intercourse, obstacles all the more serious in the case of industries which are largely dependent on the assemblage of resources now severed from one another by customs barriers. On the other hand, it is a state of things that creates the need of mutual accommodation, and this has been seen in the gradual union of the diverse elements in both Yugoslavia and Czecho-slovakia.

The rivers of this area form an important auxiliary to the means of communication. A serious impediment to navigation on the Danube formerly existed at the rapids known as the Iron Gate at the lower end of a series of rocky defiles sixty miles in length in the west of the Transylvanian Alps, but since September 1896 these reaches have afforded a navigable channel of 10 feet in depth. The mouth of the Danube from Braila, about 100 miles up, is under the control of a European commission first appointed under the Treaty of Paris in 1856. The Sulina distributary, the only one with a sufficiently gentle current to be free from excessive deposits of sediment, is kept constantly dredged from the sea to Braila.

Of the tributaries of the Danube, the Tisa (Theiss), whose tortuosity has been greatly reduced by canalisation, is navigable for

steamers to Tokay ; the Drava (Drave) to the confluence of the Mur, by smaller boats as high as Villach ; the Sava (Save) to Sisek at the confluence of the Kulpa, 366 miles above Belgrade, but its navigation is impeded by sandbanks and shifting channels.

Though the Elbe proper begins to be navigable only at the confluence of the Moldau, the navigation of that river may be said to begin at Prague, whence a steamboat company maintains regular communication with the middle Elbe and with Hamburg, which facilitates the use of this port even by Vienna.

As to climate, the inner lowlands are more especially subject to those extremes of temperature which become more characteristic as we go eastwards. With the exception of the maritime tracts, even the warmest parts of the area have at least two months in the year in which the mean daily temperature is under the freezing point, and all the lowlands of the Hungarian section have three or four months in which the mean daily temperature is above 68° F. It is only in the sheltered sub-Carpathian tracts that a summer temperature lasts long enough for the cultivation of the vine. On the other hand, even in southern Roumania the winter temperatures are very low. The average mean January temperature at Bucharest is 25° F. (against 39° in London or Edinburgh). A striking result of the physical structure of the Balkan Peninsula on the route to Salonika is that it allows piercingly cold winds to blow with great violence down the valley of the Vardar—the now well-known Vardar wind, a concentration and intensification of the northerly winter wind to the north of the mountains known as the *koshava.* On the pusstas, or vast Hungarian plains east of the Danube, so great is the summer heat, and so rapid consequently the evaporation, that though there, as in most other parts of the empire, summer is the season of greatest rainfall, these plains, which in winter are a succession of morasses or storm-swept snow-wastes, present during the hot season the appearance of withered deserts.

CZECHOSLOVAKIA

This republican state is made up of the former crown-lands of Bohemia and Moravia, the greater part of Austrian Silesia, and the mountainous or hilly tract of northern Hungary along with, on the south, a small strip of the Hungarian plain with a considerable Magyar population. Its western and northern frontiers are thus in a large measure natural, following the crest of mountain ranges, and everywhere, except in Slovakia, they include within the frontier a large German population, which is estimated to make up about 23 per cent. of the total. The Slovak portion of the state has mines of the precious metals, besides iron and salt, but is otherwise poor ;

but the remainder includes all that part of the former Austro-Hungarian monarchy which had the most abundant and varied resources.

The richest agricultural district is that towards the north of the Czech plateau (Bohemia) drained by the Elbe and its left bank tributary the Eger. Here, in addition to all the cereals of the temperate zone, are grown sugar-beet, hops, the vine, tobacco, flax, and hemp. Sugar-beet is also largely cultivated in the valley of the Morava, and just before the War the territory now embraced by this state was estimated to be the second in Europe in the production of this commodity, the total yield being equal to more than half that of Germany. Large quantities were exported to the United Kingdom, either refined (mainly from Bohemia by way of Hamburg) or raw (mainly from the Morava valley by way of Trieste).

The western part of the state is also the richest in minerals. The main deposits of coal lie to the west and south-west of Praha (Prague), those of lignite immediately to the south of the Erzgebirge. True coal is also mined in the Cieszyn (Teschen) district, formerly part of Austrian Silesia. Iron ore is found near Praha, but not in large quantity, so that the Bohemian iron industry suffered from being severed from the Styrian ores of Austria.

These regions have long been also the principal seats of manufacturing industry, and have naturally remained so under the changed conditions due to the application of machinery. In the east, however, the iron deposits of Ozd, 75 miles north-east of Budapest, with large iron-works using Silesian coal, were acquired by Hungary. At Moravska-Ostrava, in the north-east of Moravia, there are other large iron-works which obtain their supplies of Swedish ore by the Oder, and Plzen (Pilsen) has the great Skoda armament works. Cotton and jute manufactures are likewise important. Woollen manufactures flourish chiefly at Liberec (Reichenberg), in the extreme north of Bohemia, at Brno (Brünn) and Jihlavo (Iglau) in Moravia, and Opava (Troppau) in Silesia. Plzen and many other smaller towns carry on a variety of textile industries. Glass-making, which was introduced into Bohemia from Venice in the sixteenth century, and for which Bohemia has acquired and long retained a high reputation, especially as regards the treatment of crystal, is pursued chiefly at Eger (Cheb) and other places near or belonging to the Bohemian Forest, where the geographical conditions have always been favourable. The forest supplies not merely fuel but potash, and since silicate rocks have come to be used in glass-making this material is also obtained from the Bohemian Forest, and coal, as already indicated, is at no great distance. Jablonec, not far from Liberec, has long made a speciality of the manufacture of small articles of glass—buttons, beads, sham

CZECHOSLOVAKIA

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Livestock	*5·2*	*4·2*	*1·8*		
Foodstuffs	—	*18·6*	*17·7*		
Wheat and wheat flour	8·5	5·4	2·2		
Fats (including bacon)	3·6	3·4	2·9		
Maize	1·7	2·1	2·0		
Fruit, vegetables, plants	3·3	3·9	6·1		
Raw materials	—	*47·4*	*47·5*		
Cotton (raw)	15·1	10·7	7·8		
Wool (raw)	9·0	8·0	7·2		
Coal and coke	1·5	2·5	3·4		
Hides and skins	2·1	2·5	3·0		
Tobacco	3·1	2·2	2·6		
Flax, hemp, and jute, and manufactures	2·7	2·6	2·5		
Mineral oils (refined)	0·8	1·8	2·3		
Manufactures	—	*29·7*	*30·0*		
Chemicals and dyes	3·2	3·7	4·9		
Iron, and manufrs. of	2·4	3·2	2·9		
Other common metals and manufactures	2·6	3·7	3·6		
Silk manufactures	2·0	3·0	3·3		
Electrical machinery	0·9	1·6	2·4		
Other machinery is approx.	1·8	3·4	2·8		
Cotton thread, yarn, and tissues	2·9	2·5	1·8		
Total value in 1,000 million kč.	*15·9*	*17·6*	*7·8*		
Countries:					
Germany	35·2	23·5	21·7		
Bremen (free port)	—	4·7	3·0		
Hamburg (free port)	—	9·6	6·2		
United States	5·6	5·6	6·9		
Austria	7·9	7·5	5·5		
France	3·4	4·1	5·2		
United Kingdom	2·8	4·1	4·6		
Poland	4·6	6·3	4·1		
Yugoslavia	2·6	2·8	4·1		
Roumania	3·0	3·1	3·7		
Italy	6·2	2·3	3·3		
Netherlands	3·0	1·9	3·0		
Switzerland	2·3	2·4	2·9		
Hungary	5·6	5·4	2·2		

Par rate of exchange prior to September 21, 1931, 197·1 crowns (kč) = £1; 1932–35 approximately 115 crowns.

jewels, bangles, &c.—which find their way even to the most distant parts of the world. Porcelain is made near, among other places, Karlovy Vary (Karlsbad), on the river Eger, where there are deposits

CZECHOSLOVAKIA

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*13·6*	*7·6*		
Sugar (refined)	13·8	7·2	3·1		
Malt	1·2	2·4	1·9		
Cereals and flowers	1·5	2·1	1·9		
Raw materials	—	*17·8*	*20·3*		
Coal, lignite, and coke	6·2	4·1	5·6		
Building timber	3·9	2·7	2·5		
Manufactures	—	*68·1*	*70·1*		
Cotton yarn and tissues	15·0	14·2	9·9		
Woollen goods	10·3	9·9	7·2		
Silk, and manufrs. of	—	3·2	4·2		
Iron, and manufrs. of	6·4	7·2	8·7		
Leather, and manufrs. of	2·2	5·9	6·3		
Other base metals and manufactures	1·5	2·4	3·1		
Machines and vehicles	2·8	3·5	4·1		
Glassware	5·4	6·3	4·9		
Earthenware	—	2·4	2·5		
Flax, hemp, and jute, and manufactures	3·5	3·2	3·6		
Total value in 1,000 million kč.	—	*19·4*	*8·3*		
Countries:					
Germany	19·5	20·5	17·2		
Hamburg (free port)	—	4·5	2·0		
Austria	20·7	15·0	12·0		
United Kingdom	9·3	7·6	7·0		
United States	4·2	5·6	6·9		
Switzerland	2·6	2·8	5·3		
Yugoslavia	4·9	7·0	4·5		
France	1·7	1·6	4·4		
Roumania	4·7	4·1	3·8		
Netherlands	1·5	1·9	3·8		
Poland	3·3	3·5	2·8		
Italy	4·9	2·6	2·7		
Hungary	6·7	7·4	2·4		

of kaolin. Plzen is noted for its beer. The great Bata shoe factory, products from which are now found all over the world, are at Zlin.

Praha or Prague is the old capital of Bohemia, a province which is marked out by nature in the most unmistakable manner, and in

which a dense population has existed from a remote period, and is now the capital of the republic. It occupies a situation which a variety of physical features combine to fix as a commercial centre. It lies near the middle of the province, at the head of navigation on the Vltava (Moldau) for boats of considerable size, about the place where the steeper ascent to the highlands of southern Bohemia begins, and at the meeting-place of roads from gaps in the mountains on the east and west. Bratislava (Pressburg) on the Danube where that river enters the state has for that and other reasons an important commercial situation. It may be regarded as a natural focus of European waterways embracing canal connections with the Rhine, Elbe, Oder, and Vistula.

TOWNS OF CZECHOSLOVAKIA, 1935

Praha	920,000	Moravska-Ostrava .	125,000
Brno	263,000	Plzen	114,000
Bratislava . . .	129,000		

HUNGARY

This ancient kingdom, now under a regent, is confined to the plains of the Danube, where the population is predominantly Magyar, but not without admixture. Actually the area left to Hungary is only the centre of the plain, and there are far more Hungarians living outside the country than there are aliens within Hungary. These plains, known in Hungarian as the Alföld (*i.e.* ' lowland '), formerly deserved the name of puztas (pusstas) or ' desert ' in a much greater measure than they do now, a great deal of reclamation having been carried on. On the one hand, the introduction of the *Robinia pseudacacia* has enabled other trees also to thrive, and has thus led to the establishment of forests and vineyards on tracts that were previously sandy wastes. Otherwise Hungary has lost the forests on the margins of the plains, formerly a source of wealth. On the other hand, extensive swamps have been rendered habitable by the regulation of the Tisa. Agriculture, including the rearing of live-stock, is here the prevailing industry. The dry climate is well suited to the growth of wheat rich in gluten. Down to the time of the War both branches of agriculture were steadily improving. Manure was being more and more largely used and the average yield of wheat increasing. Large quantities of agricultural machinery were coming to be used, small cultivators uniting to purchase machines. Among agricultural specialities may be mentioned the wines derived from vineyards occupying old volcanic soils in the north. The most celebrated are round the village of Mád on the slopes of a hill to the north-west of Tokay, which gives name to the wine ; but other highly esteemed Hungarian

HUNGARY

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Foodstuffs	—	*6·9*	*9·8*		
Cereals and seeds	1·9	2·5	3·7		
Fruits and plants	—	2·3	2·9		
Raw materials	—	*40·2*	*47·1*		
Timber and wood	10·0	11·7	10·0		
Cotton (raw and yarn)	4·8	2·2	6·3		
Raw hides	1·4	1·9	4·0		
Coal, coke, and lignite	7·0	5·8	4·0		
Other minerals	—	2·4	2·8		
Mineral oils	1·9	2·7	3·3		
Metals (raw)	2·8	3·4	3·1		
Silk (raw and yarn)	—	1·7	3·2		
Manufactures	—	*50·5*	*50·8*		
Chemicals, dyes, &c.	1·8	3·7	8·2		
Paper, and manufrs. of	2·4	4·0	5·7		
Machinery and appliances, electrical	0·5	1·6	1·4		
Machinery and appliances, other	4·5	4·2	3·1		
Vehicles	—	2·6	2·0		
Cotton yarns	4·8	2·8	1·8		
Woollen tissues	8·9	4·3	1·8		
Cotton tissues	14·0	6·8	1·7		
Silk tissues	1·3	2·4	0·6		
Other textiles	0·3	6·1	1·6		
Total value in 1,000 million pengős	*0·70*	*1·05*	*0·38*		
Countries:					
Germany	12·5	19·0	21·5		
Czechoslovakia	25·2	22·7	8·3		
Austria	23·2	15·7	18·2		
Roumania	7·8	8·3	10·9		
Italy	4·2	4·5	7·6		
Yugoslavia	4·0	4·6	5·7		
United States	2·5	3·5	5·1		
United Kingdom	2·2	3·2	4·6		
France	1·6	2·6	3·4		
Poland	5·5	2·5	2·0		
Switzerland	3·8	3·4	2·7		

Par rate of exchange prior to September 21, 1931, 27·82 pengős = £1; 1932–35 approximately 16·5 pengős.

wines come from other volcanic soils farther west, clothing the slopes of Matra, and from sheltered lands north of Lake Balaton. Great attention has been paid in recent years to improving the breed of the more important domestic animals, including the pig, and

HUNGARY

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Livestock	—	*14·6*	*14·1*		
Animals for slaughter or working	9·6	13·6	12·8		
Foodstuffs	—	*52·1*	*42·8*		
Wheat	8·4	11·9	10·0		
Poultry (dead)	3·1	3·7	5·8		
Flour	17·6	9·8	3·3		
Lard and bacon	—	1·8	2·9		
Eggs	1·6	2·3	2·1		
Wine and spirits	1·3	1·8	1·9		
Rye	5·7	3·7	1·5		
Raw materials	—	*13·2*	*14·4*		
Leathers	2·4	2·2	2·5		
Manufactures	—	*19·3*	*28·2*		
Textiles	2·0	4·5	3·8		
Machinery and apparatus, electrical	3·0	2·3	6·7		
Machinery and apparatus, other	2·8	2·4	2·0		
Total value in 1,000 million pengös	*0·58*	*0·89*	*0·43*		
Countries:					
Austria	36·5	32·9	26·3		
Germany	7·9	11·8	17·0		
Italy	6·1	6·7	9·6		
United Kingdom	1·6	3·1	8·0		
Czechoslovakia	24·1	18·0	5·3		
Switzerland	2·0	3·6	5·1		
Roumania	5·3	4·3	4·1		
France	0·4	1·0	3·8		
Poland	2·6	2·3	0·9		

there are large government horse- and cattle-breeding establishments —the horses chiefly English and Arab breeds, the cattle mainly the Swiss Simmental, which is good for both meat and milk. Some coal is found within the angle of the Danube to the north-west of Budapest and also near Pécs, in the south-west, and a little iron near Szeged, on the Tisa, opposite the confluence of the Maros, but there are no other important minerals.

Manufacturing industries in the modern sense of the term are important only in the capital, where there has been a remarkable post-War development, especially of electrical machinery. Until the War Hungary, being mainly a region in which even agriculture had only recently begun to advance under the stimulus of cheapened communication with distant markets, did not afford a market for manufactured products at all corresponding in value to its population. The peasants were, and still are, poor, and wear chiefly coarse woollen fabrics, strong enough to last for years or almost a lifetime, and many of them simply sheep-skins with the wool turned inwards. But there can be no doubt of the steady advance in the standard of living.

The capital is Budapest, situated on both banks of the Danube in a position strengthened by the spurs of the last hills skirted by the river before it traverses the Hungarian plains. It is the only city in the state comparable with those of western countries. The other towns, such as Szeged, Kecskemet, Debreczen, and Szabadka, are more like large agglomerations of villages, being spread over areas of from 310 to 375 square miles in extent (compare Midlothian, 362 square miles).

TOWNS OF HUNGARY, 1935

Budapest	1,061,000	Debreczen	123,000
Szeged	140,000		

YUGOSLAVIA

This kingdom stretches from north-west to south-east, mainly through the Balkan Peninsula, but includes also in the north more than a third of the former duchy of Styria, the greater part of Carniola, a small part of Carinthia, and considerable areas detached from the former kingdom of Hungary.

In respect of physical features it is mainly mountainous in the north-west and west: in the north-west traversed by the south-eastern members of the Alps with an east-west trend; in the west by the ranges of the Dinaric Alps, which trend from the north-west to the south-east, the eastern chains largely composed of limestones, including in places steep and rugged dolomitic summits, the western composed of the younger limestones of the region known as the Karst or Carso, an area presenting to view large expanses of grey naked rock with patches of soil of varying depth, generally thin, only in isolated hollows, and, in spite of a heavy rainfall, without surface water, except where it emerges in springs from the base of characteristically fissured cliffs. These features extend into western Bosnia, but the north-east of that province is composed of a gently undulating, fruitful, densely peopled hill country, sinking

gradually to level plains traversed by the Sava, Danube, and Mur. The south-east of the kingdom is mountainous, but with fertile valleys and basins.

Actually, Yugoslavia consists of the union of nine old political divisions, which were also in large measure geographical units. The first was Slovenia (the Alpine northern region) ; the second Croatia, a transition hilly area between the Alps and the Dinaric Alps ; the third Slavonia, an inland area transitional to the Hungarian plain ; the fourth Vojvodina, a part of that plain. The fifth and very distinctive Adriatic coast with its Mediterranean climate and marked Italian influence was Dalmatia ; the sixth, seventh, and eighth were the forested mountainous Bosnia, Herzegovina and Montenegro (the latter an independent kingdom before the War), lying in the hinterland of Dalmatia. The ninth was Serbia, mainly Balkan in position and affinities. It has been the deliberate policy of the government in attempting to unite the country to eliminate these old divisions and to create instead nine ' banovinas ' of roughly equal size.

Agriculture forms by far the most important industry of the state, though the land under the plough is equal to little more than one-fourth of the surface, the proportion, however, rising to 68 per cent. in the principal agricultural area, that known as the Vojvodina, made up of the eastern plains north of the Danube, to a large extent covered by lœss, which in summer is an almost unbroken expanse of maize and wheat. Farther to the west the surface, while still offering much arable land, rises towards Zagreb, the chief town of Slavonia, and still farther west (in Slovenia) the arable land is found in isolated basins, the most important of which is that of Ljubljana (Laibach), about 25 miles in length by 6 in width, everywhere at a level of more than 900 feet above that of the sea. Maize and wheat are the principal crops of the entire state, occupying about the same extent of ground, but maize giving by far the larger yield. Among other crops may be mentioned sugar-beet, hops, hemp, and flax. Fruit trees and, above all, plums abound, notably in Serbia, and the vine is largely cultivated, especially on slopes with a favourable exposure in the north-east both north and south of the Danube. Cattle are largely reared in the Alpine districts, horses chiefly in the Vojvodina, and pigs in great numbers in all the most populous parts of the state. Sheep and goats are most numerous in the Karst, the latter to a large extent a pest through their habit of devouring the tops of growing trees. Forests are most extensive in the Alps of Slovenia and in Bosnia. Dalmatia, the maritime tract of the kingdom, has all the products of a Mediterranean country, with laurel thickets, groves of pines and cypresses, besides olives, figs, oranges, and citrons.

Among minerals the most important are coal, met with in

various places, iron ore (magnetite) and copper, both in the north-east in the tract south and west of the Dànube, lead to the south of

YUGOSLAVIA

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*11·1*	*9·4*		
Industrial and medicinal plants	—[1]	2·9	5·2		
Animals and animal produce	4·9	4·7	5·0		
Products of agric. industry	15·2	4·6	4·6		
Coffee		2·8	2·1		
Raw materials	—	*17·3*	*20·1*		
Coal, coke, and manuf. fuel	6·4	2·6	3·1		
Mineral oils		3·3	2·8		
Manufactures	—	*71·4*	*68·8*		
Cotton goods	—[2]	18·2	16·1		
Woollen goods	40·0	7·3	7·1		
Hemp and flax		2·3	1·9		
Other textiles		4·9	5·6		
Iron and steel	11·1[3]	10·6	9·9		
Machinery and apparatus	6·0	6·6	4·8		
Chemicals and drugs	3·5	3·4	3·5		
Paper, and manufrs. of	2·0	2·6	3·2		
Electro-technical articles	—[4]	2·2	3·2		
Vehicles	—[4]	2·3	1·7		
Total value in 1,000 million dinars	*8·2*	*7·5*	*3·6*		
Countries:					
Germany	8·3	14·2	16·1		
Czechoslovakia	20·1	18·2	14·3		
Austria	19·8	18·2	13·8		
Italy	20·5	12·1	12·9		
United Kingdom	10·6	6·0	8·6		
United States	3·9	4·3	5·3		
France	3·4	4·3	4·5		
Hungary	2·9	5·7	4·0		
Switzerland	0·8	1·6	2·6		
Roumania	2·2	4·3	2·2		

[1] Included in the 15·2 of coffee and agricultural products.
[2] Included in the 40·0 of textiles.
[3] Includes copper and other metals.
[4] Included with machinery.

Par rate of exchange prior to September 21, 1931, 276 dinars = £1; 1932–35 approximately 210 dinars.

Belgrade and north-west of Ljubljana, salt in the north-east of Bosnia, and bauxite in Dalmatia. The principal coal-mines lie

between Ljubljana and Zagreb, and furnish fuel to blast-furnaces smelting imported ores in the Ljubljana basin.

The external commerce consists chiefly in the exporting of maize, wheat, cattle, meat, eggs, swine, fruits, timber, and copper. Belgrade,

YUGOSLAVIA

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Livestock	—	*13·9*	*13·8*		
Pigs	2·8	5·2	6·3		
Cattle	7·8	4·7	2·7		
Foodstuffs	—	*32·5*	*32·6*		
Maize	6·1	5·8	10·8		
Other cereals	8·4	8·4	4·4		
Medicinal and indust. plants	—	3·5	6·5		
Eggs	6·5	7·3	5·0		
Meat, game, extracts, &c.	5·6	3·9	4·8		
Plums (dried and in brine)	1·9	1·8	1·9		
Raw materials	—	*44·7*	*46·6*		
Building timber	17·0	15·5	15·8		
Other forest products	—	5·5	2·4		
Chemicals	—	4·6	3·4		
Minerals	7·0	2·0	2·7		
Cement	2·0	1·9	2·1		
Manufactures	—	*8·8*	*6·8*		
Copper, and manufrs. of	3·7	5·0	8·1		
Total value in 1,000 million dinars	*9·5*	*7·1*	*3·8*		
Countries:					
Italy	28·9	25·8	21·4		
Austria	24·5	18·9	14·1		
Germany	4·1	10·4	14·1		
Czechoslovakia	9·9	9·2	12·8		
Hungary	7·9	7·0	4·5		
Greece	7·1	7·8	4·2		
United Kingdom	1·4	1·3	3·4		
Switzerland	4·1	3·0	2·9		
France	3·8	3·4	2·4		
Roumania	2·7	5·5	1·9		

the capital of the kingdom, is centrally placed on the Danube and the railways and waterways which radiate from thence. At first Yugoslavia made extensive use of the Italian ports of Trieste and Fiume, but the latter has been replaced by Susak. The Dalmatian ports are difficult of access from the interior: Dubrovnik (Ragusa) is the chief, with Split (Spalato) farther north and Kotor (Cattaro)

as the outlet of Montenegro. Salonika is the chief outlet of the old Serbia.

TOWNS IN YUGOSLAVIA, 1931

Belgrade	239,000	Sarajevo	78,000
Zagreb	186,000	Skoplje	69,000
Soubotitza	100,000	Ljubljana	60,000

ROUMANIA

Of all the European states which had their boundaries readjusted at the conclusion of the Great War, Roumania is that in which least regard seems to have been paid to the physical features in the delimitation of the frontiers. The mountains which formed topographically a natural boundary for the older Roumania on the north and west now run through the middle of the kingdom. On the other hand, it may be pointed out that the river Dniester, which is now recognised by the great Powers as the eastern frontier north of the Black Sea, is well adapted for that purpose from a strategical point of view, its lower course flowing through a broad and swampy valley, like most of the Roumanian side of the lower Danube, while the higher part is deeply sunk in a narrow trough. Inside the mountains the northern and western frontier winds through cultivated loess, sandy pusstas, and marshes similar to those of the Hungarian plain. The mountains which divide the kingdom into two parts are themselves composed of two parts, contrasting with one another both in geological structure and in form. The portion running east and west, known as the Transylvanian Alps, is mainly composed of ancient crystalline rocks with steep forest-clad slopes, while that whose trend is mainly north and south is composed of softer rocks largely denuded of forest, and generally lower in elevation. The Predeal Pass, nearly due north of Bucharest, approximately marks the limit between the two sections.

The part of the country outside the mountains is again made up of two portions, which, though very far from equal in area, must be treated separately: a section on the left of the Danube and partly north of the Black Sea, formed of the old principalities of Moldavia and Wallachia, together with the recently added Bukovina and Bessarabia, and the Dobruja, on the right bank of the Danube. The former section may be described as a plateau in the northern or Bukovinian and Moldavian area, and as a continuation of the Russian plain in the southern or Wallachian area. Bessarabia, though inhabited mainly by Roumanians, except in the south, where there are many Bulgarians (to the west) and Russians (to the east), was in Russian hands down to the War, the greater part from as far back as 1812, the remainder from 1878. The climate and

products are similar to those of the adjoining part of Russia. Maize is the principal crop, as it is the chief food of the small peasantry occupying the numerous villages among the hills, whereas wheat is the great crop of the loess-covered plains, where it is grown largely for export by large landowners using advanced agricultural machinery. The cultivation of wine and sugar-beet is spreading. The table of exports, given below, shows that the list is headed by wheat, maize, and other grains, but there is a growing export of oil-seeds and petroleum, and it is probable that these commodities with timber will continue to be the chief exports of the state. The petroleum is produced along the face of the Carpathians, to the north-west of Bucharest, and to the south-west of Jassy, and the production is largely controlled by a number of British-owned companies and the Government. The production of petroleum increased from 543,000 barrels in 1896 to 12,976,000 barrels in 1912, and to 35,000,000 barrels in 1929 after a temporary set-back due to the destruction of wells during the War.

The principal Danubian ports in Roumania are Galatz, situated at the point where the Danube on receiving the Seret turns eastwards, and Braila (Ibraila), at the next bend of the river higher up. The former is the natural port for northern Roumania, the latter for southern Roumania, including Bucharest. Above Braila, the value of the Danube for Roumanian commerce is somewhat impaired by the low and marshy character of the river bank, which affords few good sites for towns. Galatz serves as the chief port even of Bessarabia, Akkerman on the shallow Dniester liman or lagoon having only local services to Odessa, and inland up the Dniester to the Yampol rapids.

Besides Bucharest, the capital of the whole kingdom, the chief inland towns are Ployeshti, Craiova, Jassy, the capital of Moldavia, Chishinau, the capital of, and Cernautzi, a university town in, Bessarabia, and Timisioara in Transylvania.

The Dobruja, which since 1913 extends to the Tutrakan-Balchik line, thus including a considerable tract inhabited by Bulgarians and Turks, is made up to the extent of about half of its area of uninhabitable and unhealthy marshes, mainly belonging to the delta of the Danube. The remainder is habitable and to a large extent fertile land, but so far the province is mainly pastoral in its character. Wool is produced in large quantity. A railway from Bucharest crosses the Danube at Chernavoda by a bridge opened in 1895, and runs thence eastwards to Constanza or Kustenji, its chief port. The port of Mangalia is farther south.

The interior or Transylvanian portion of the kingdom added after the Great War is an intricate complex of forest-clad heights enclosing cultivated valleys and basins, with vineyards and orchards on the slopes enjoying a southern aspect. Forests occupy nearly

ROUMANIA

GENERAL IMPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentages of Total Value.				Principal Countries.	Percentages.			
	1901–05	'06–10	1913	'25–27	'01–05	'06–10	1913	'25–27		'01–05	'06–10	1913	1927
1. Iron and steel	1·07	2·39	2·99	5·69	9·0	11·6	12·6	18·1	1. Germany	28·5	33·9	40·3	22·3
2. Cotton manufactures	1·87	1·61	1·98	—	15·7	9·9	8·3	—	2. Austria-Hungary[2]	27·1	21·6	23·4	13·3
,, piece goods	1·59	—	1·00	4·67	13·3	—	4·2	14·9	3. United Kingdom	16·8	15·4	9·5	8·4
3. Machinery	0·82	1·54	2·36	2·78	6·8	9·4	10·0	8·9	4. France	5·8	5·5	5·8	7·7
4. Woollens	1·26	1·11	0·78	1·31	10·5	6·8	3·3	4·2	5. Italy	5·8	4·9	3·7	8·7
,,	1·12	—	—	—	9·4	—	—	—	6. Turkish Empire and Egypt	3·6	3·7	2·6	2·5
5. Cotton yarn	0·55	0·90	0·92	2·13	4·6	5·5	3·9	7·7	7. Belgium	2·0	3·1	2·8	2·6
,, ,, undyed	0·38	—	—	—	3·2	—	—	—	8. Russia	2·6	2·7	2·2	0·1
6. Vehicles	0·06	0·55	1·09	1·76	0·5	3·4	4·6	5·6	9. Switzerland	1·9	1·8	1·3	2·0
7. Silk manufactures	0·28	0·15	—	0·49	2·3	2·8	—	1·6	10. Netherlands	1·7	1·3	0·9	1·5
Silks and mixed tissues	0·20	—	—	—	1·7	—	—	—					
8. Coal and coke	0·20	0·32	0·52	0·27	1·7	1·9	2·2	0·9					
Average total value	11·96	16·36	23·59	31·38									

GENERAL EXPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	1901–05	'06–10	1913	'25–27	'01–05	'06–10	1913	'25–27	Principal Countries.	'01–05	'06–10	1913	1927
1. Wheat	5·30	8·70	8·33	1·17	36·7	43·4	31·0	3·6	1. Belgium	13·6	29·5	27·1	3·0
2. Maize	2·58	4·03	4·63	5·02	17·9	20·1	17·3	15·1	2. Netherlands	9·6	11·2	6·7	3·0
3. Barley and malt	1·31	1·58	1·93	3·94	8·4	7·9	7·2	11·8	3. Italy	7·4	10·9	10·6	6·7
4. Petroleum	0·49[3]	1·23	2·11	3·42	3·4	6·2	9·0	10·3	4. United Kingdom	8·5	9·9	6·7	5·9
5. Oil-seeds	0·90	—	0·53	1·03	6·2	—	2·0	3·1	5. Austria-Hungary[2]	13·1	9·7	14·3	13·1
6. Building wood	0·47	0·01	0·71	4·51	3·3	4·5	2·8	13·6	6. France	3·3	6·5	9·5	3·6
7. Oats	0·65	0·62	0·89	0·29	4·5	3·1	3·3	0·9	7. Germany	7·1	6·2	7·8	18·6
8. Rye	0·53	0·56	0·36	0·21	3·7	2·8	1·4	0·6	8. Turkish Empire, including				
9. Wheat flour	0·23	0·40	1·13	0·70	1·6	2·0	5·3	2·1	Egypt	2·9	6·0	5·5	5·3
10. Haricots	0·20	0·32	0·61	0·69	1·4	1·6	2·3	2·0	9. Russia	1·6	1·1	0·5	—
11. Eggs	0·16	0·13	0·33	0·55	1·1	0·7	1·2	1·6	10. Bulgaria	1·2	0·8	1·4	1·0
Average total value	14·43	20·03	26·83	33·33									

[1] 'Official values' revised in 1902, 1904, and 1905. Since 1905 cereals have been revised quarterly and other articles annually. The figures for 1913 and 1925–27 refer to special trade. Rate of exchange for 1925–29 calculated on rough average is 966·9 lei = £1, and 1925–27, 1,073·7 lei = £1.
[2] 1927, Austria only. [3] Over one-third due to over-valuation of benzine in 1902. *N.B.*—Exports 1925–29, except oil-seeds and eggs, which are for 1926–27.

40 per cent. of the surface. The strip of plains abounding in cereal crops on the west is generally narrow, widest in the Banat. Cattle and sheep are numerous, and even before the War migratory shep-

ROUMANIA

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.[1]	1931–34.	—	—
Foodstuffs	—	—	*6·1*		
Raw materials	—	—	*13·5*		
Manufactures	—	—	*80·4*		
Cotton yarns	6·1	8·1	16·7		
,, piece goods	19·5	11·0	6·4		
Woollen yarns	1·0	2·6	4·4		
,, piece goods	7·3	2·7	0·4		
Other vegetable textiles	3·6	5·6	4·4		
Iron and steel, and metals	17·1	11·6	15·6		
Machinery	6·7	11·4	10·1		
Chemicals and drugs	1·8	2·2	4·1		
Earthenware, stone, glass	2·1	2·6	2·9		
Paper, and manufrs. of	2·3	1·4	2·5		
Vehicles	2·4	4·9	2·5		
Leather, hides, and manufrs. of	2·2	2·9	2·1		
Total value in 1,000 million lei	*26·2*	*30·9*	*13·2*		
Countries:		1927 & 29.[2]			
Germany	19·2	23·2	22·3		
Czechoslovakia	11·5	13·9	10·9		
France	8·1	6·6	10·2		
United Kingdom	9·8	7·8	12·0		
Italy	10·0	7·8	9·3		
Austria	16·8	12·9	8·9		
Hungary	4·2	4·3	4·0		
United States	0·9	4·5	3·5		
Poland	9·0	6·2	3·4		
Belgium	1·9	2·8	3·2		
Switzerland	1·2	2·1	3·0		
Egypt	2·4	1·7	1·4		

[1] Figures are omitted for 1928, as not available.
[2] Figures are for 1927 and 1929. Others not available.

Par rate of exchange prior to September 21, 1931, 813·6 lei = £1; 1932–35 approximately 500 lei.

herds led their sheep across the mountains to winter in Wallachia, on the borders of the Danube. This territory adds also to the variety of the Roumanian mineral wealth. The gold-mines near the former royal smelting works at Zalatna, to the north and west of the Maros in about 46° 10′ N., are the most productive in Europe next to those

of the Urals. Coal and iron ore are both found in the Banat, where iron and steel works have for some time been in operation near Reshitsa and Anina. Rock-salt and natural gas occur at several points.

ROUMANIA

SPECIAL EXPORTS

	Percentages of Total Value.				
	1921.	1926–30.	1931–31.	—	—
Livestock	—	—	*3·8*		
Pigs	2·3	3·0	1·4		
Oxen	7·5	3·7 [1]	1·3		
Foodstuffs	—	—	*24·1*		
Wheat	4·3	4·1	3·1		
Barley	8·4	13·5	6·0		
Maize	20·3	14·0	7·9		
Beans	3·0	1·9	1·5		
Raw materials	—	—	*70·4*		
Petroleum (crude, residual, and gas oil)	0·5	5·0	10·5		
Petroleum (refined)	3·6	6·6	5·7		
Benzine	7·0	15·8	17·0		
Timber and wood	17·7	14·1	7·2		
Total value in 1,000 million lei	*27·8*	*32·1*	*12·5*		
Countries:		1927 & '29.[2]			
Germany	5·7	13·1	13·5		
United Kingdom	5·8	6·1	12·5		
Italy	5·0	7·2	10·6		
Austria	13·8	11·2	9·1		
France	6·3	4·0	7·5		
Hungary	14·6	8·7	6·6		
Czechoslovakia	9·3	2·7	6·0		
Netherlands	3·9	2·0	4·6		
Egypt	3·2	4·5	4·3		
Belgium	5·3	2·3	3·9		
Greece	5·7	3·4	3·5		
Poland	3·5	5·6	1·5		
Gibraltar	8·8	6·8	0·8		
Bulgaria	2·5	1·6	0·8		

[1] 1927 figures omitted.
[2] Figures for 1926, 1928, and 1930 not available.

TOWNS OF ROUMANIA, 1935

Bucharest	640,000	Galatz	102,000
Chishinau (Kishinef)	116,000	Cluj	99,000
Cernautzi (Czernowitz)	111,000	Timisioara (Temesvar)	91,000
Jassy	104,000	Braila	69,000

SWEDEN AND NORWAY

These two countries, which were under one king from 1814 to 1905, may be suitably treated of together, because they both occupy the Scandinavian peninsula, and hence have certain great physical features in common. The greater part of this peninsula is made up of a high tableland furrowed by deep and narrow river valleys. The surface of this tableland rises from about 1,000 feet in height in the north to upwards of 3,000 feet in the south, and, as increasing height thus takes away the advantage of a more favourable latitude, the higher parts present everywhere a desolate aspect, almost the only vegetation being that of a tundra with heaths, mosses, and lichens. The high plateau reaches the west coast and is there cut into by the remarkably deep, steep-sided inlets of the sea known as fjords, which give Norway its characteristic scenery. In Sweden the plateau drops by a series of broad steps to the Baltic Sea, so that the lofty 'fjeld' gives place to broad stretches of forest intersected by numerous lakes. There is a large stretch of lowland in southern Sweden, comparable in general character with the European plains, but Norway has little cultivable lowland; indeed its settlements are restricted to the heads of the fjords or to a few valleys in the west, with a large area round Oslo Fjord. Hence the total area under crops and grass in Norway, notwithstanding that it has a more favourable climate than Sweden, is only 4 per cent. of the surface, as against 12 per cent. or more in Sweden; and hence, too, the inferior density of population in the former country as compared with the latter.

The rivers of the peninsula are for the most part too much obstructed by rapids to be of any great use for navigation, but some of their valleys are long enough and direct enough to facilitate communication greatly between the more populous districts on different sides of the plateau. A railway runs from Trondheim, nearly due southwards, to Oslo, by the valley of the Glommen and the side of Lake Mjösen, which lies to the west of an easterly deviation of the Glommen. Another railway runs from Trondheim eastwards across the tableland, from the eastern base of which it descends south-eastwards to Stockholm. A third railway across the tableland, the Luleå-Narvik, is noteworthy as having been for long in a higher latitude than any other railway in the world (until the opening of the Murmansk line in Russia), the greater part of its route being

within the Arctic Circle. A fourth was opened on November 27, 1909. This connects Bergen with Oslo, and reduced the time-distance between these places from 54 to 14 hours. It is 492½ miles in length, has 184 tunnels with an aggregate length of 23½ miles, and reaches a level of 3,700 feet. In the south there are train-ferry connections between Sweden and Denmark.

Though the rivers of the Scandinavian peninsula are of little service to navigation, the lakes of the lowland region of southern Sweden are of considerable importance in this respect. Lakes Vener and Vetter, and other smaller lakes, together with the navigable portion of the Göta River, are all connected by a ship canal, the Göta Canal, nine feet in depth, and water-communication is thus established between the opposite coasts of southern Sweden from Göteborg to Stockholm.

In recent years the rivers have become increasingly important as sources of water-power. The total amount of available water-power undeveloped in Norway is estimated at 9·5, against 2·2 millions already developed. In Sweden the undeveloped power is estimated at 5·0 million h.p. against 1·7 million developed. The power is utilisable for nine months in the year, and is largely employed in both countries in the manufacture of wood-pulp, carbide of calcium, nitrogenous manures, &c. The Swedish government is acquiring water-powers for the electrification of the railways belonging to the state. The Lapland iron ore line is electrified; the main line from Göteborg to Stockholm was electrified in 1926. In Norway, under an Act passed in 1909, no water-power above 1,000 horse-power is to be granted without the consent of the Crown, and then only for a period of 80 years, after which the power and the installations are to become the property of the state. Before the passing of this Act about 750,000 horse-power had already been granted, 450,000 being controlled by foreign capital. Large works for the manufacture of calcium cyanamide and electrical smelting have been set up at Odde and Tyssedal, at the end of the southern arm of the Hardanger Fjord. By another process nitrate of lime and smaller quantities of nitrate of soda and nitrate of ammonia are manufactured at Rynkam and Notodden on Lake Hittendal, south-west of Oslo, and conveyed thence by barges to the seaport of Skien. From the Trollhätten falls on the Göta River power is obtained for the manufacture of chrome steel as well as for electric zinc refining, the ores for the latter industry being obtained from Greece and Australia. Cables under the Sound now convey electrical energy developed from water-power to Denmark. At Sarpsborg, in Norway, to the east of the Oslo Fjord are large works for the manufacture of carbide of calcium, and here also are the first zinc-rolling mills erected in that country.

The products of the two kingdoms are in some respects similar,

and their nature is in some degree illustrated by tables of exports and imports given below. From those tables it will be seen that in both timber products form the most important of the exports. In Sweden, the forests cover about 60 per cent. of the surface; in Norway, about 25 per cent.; and the two countries together furnish about two-fifths of the timber exported by European countries. In Norway 12½ per cent. of the forests belong to the state. The timber is chiefly that of pine and fir, and is valued on account of its hardness and durability, qualities which are due to the closeness of the annual rings in consequence of the shortness of the summers. There is now comparatively little timber left for export in Norway. Upwards of 16,000 miles of channels for floating timber have been equipped in Sweden, seven-eighths of them in Norrland, Dalarne, and Värmland. Wood-pulp for paper-making is among the timber products of greatest importance in both Sweden and Norway, and in both countries the abundance of wood has also given rise to a large manufacture of matches. The corn and green crops of both kingdoms are much the same as in Great Britain, but in both parts of Scandinavia oats and barley predominate. In Sweden butter is an agricultural export of great importance. Dairy schools have been established; and it may also be mentioned here, as an illustration of the importance of this industry in Sweden, that the cream-separator is a Swedish invention.

The export tables of the two countries reveal in the plainest manner the mineral wealth of Sweden, and the extensive development of the Norwegian fisheries. Both countries, it will be seen, import coal, though a little coal is found in Sweden in the part of Scania adjoining the north end of the Sound. Special attention should be given to the rapid increase of the exports of iron ore and of iron and steel wares from Sweden and that of the imports of coal and coke into the same country, at least in pre-War years. The ore exports are principally from the deposits of Swedish Lapland, close to the railway running from Luleå to the Ofoten Fjord. There at Gellivara and about 60 miles farther north at Kirunavara, Luossavara, and Tuolluvara are the most important and easily worked deposits of iron ore in Europe. They all contain a high percentage of iron, nearly all above 60 per cent., in some cases 68 to 69 per cent.; but while some of the ores are suited for the acid Bessemer process with a maximum of 0·05 per cent. phosphorus, the phosphorus content is mostly high—from 0·6 to 3·5 per cent. By the Luleå-Ofoten railway, opened in July 1903, these ores can be brought down to the port of Narvik in Norway, which is always ice-free. Phosphoric ores are still more abundantly produced at Grangesberg, south-west of Falun, in about 60° 10′, and are exported in large quantity from Oxelösund (in 58° 40′ N.). The seat of the old-established mineral industries of Sweden, however, is in the east

of the country on both sides of the Dal River, to the south of which lie the celebrated magnetic mines of Dannemora. In this district there is abundance of iron ore low in phosphorus and suited for the making of first-class steel, especially when smelted with charcoal. The import of coal and coke into Sweden not merely betokens the growth of Swedish manufactures generally, but is in keeping with the fact that the diminishing proportion of pig and bar iron and blooms exported is partly accounted for by the increasing proportion of exported iron and steel wares. The development of hydro-electric power has led Sweden to take a leading part in the manufacture of electrical machinery. In the southern mining region Sweden also produces copper, at Falun, west of Gävle, and silver and lead at Sala, west of Uppsala.

Of the minerals of Norway there are valuable mines of copper ore at Röros in the valley of the Glommen, at Sulitjelma, and elsewhere, and silver at Kongsberg, about thirty miles west of Oslo Fjord; apatite occurs at various places near Stavanger, and a famous deposit of infusorial earth containing from 85 to 95 per cent. of pure silica near the same town. Low-grade iron ores are known to exist in great abundance in Dunderland, at the head of the Ranen Fjord, in the province of Tromsö, about 66½° N., as well as at various places farther north, including Bogen on the Ofoten Fjord, and here as well as at Sydvaranger, close to the frontier of Finland, great plants have been erected for treating the ore in such a manner as to raise the iron content so that the ore in briquettes and other forms contains upwards of 60 per cent. of iron and little phosphorus. Associated with the iron ores are mines of iron pyrites which account for the growing export of sulphur. Nickel ores are also mined and are refined electrically at Kristiansand. But it is the growth of electrical smelting which has led to the rise of aluminium to the position of first importance among the mineral products of Norway. Granite and other stones are also largely exported.

Bergen, on the west coast, north of 60°, is the centre of the Norwegian herring fisheries, and multitudes of the smaller fish are tinned and sold as brisling. The cod fisheries are mainly carried on in spring, on a shallow bank surrounding the Lofoten Islands. This is the emporium of the North Norwegian, his field and his shop, from which his family and house are supplied, and without it Nordland and Finnmarken would boast few other inhabitants than seals and seabirds. The importance of the whale fishery, including the bottle-nose fishery, of Norway was long indicated by an export of 'train oil.' At Bergen, Oslo, and Stockholm, the shortest day is less than six hours long; at Trondheim and Härnösand, only about four hours. The necessary illuminant is obtained in Sweden by importing mineral oil, but in Norway the home-made 'train oil'

has long enabled the inhabitants to a large extent to dispense with the imported article. Train oil, however, is now the basis of important chemical industries. The Norwegians are prominent among those who go farthest afield in this industry, especially since whaling was prohibited near the coast (in 1904).

The herring fisheries of Scania on the south-west of Sweden were at one time important, but the herring migrated from the Baltic and the fisheries now vary greatly from year to year. The Hanseatic League during the height of its power claimed for its members the sole right to carry on these fisheries, though they permitted others to have establishments on the coast for the salting and packing of herrings.

The absence of raw cotton from the list of chief imports of Norway shows the undeveloped state of the textile industry in that country as compared with Sweden. The chief industrial towns in the latter country are Stockholm, the capital, Göteborg, and Norrköping.

The chief seaport of Sweden is Göteborg (Gothenburg), the port most directly accessible from Great Britain and France, as well as Hamburg, from which Sweden obtains most of its coffee, and Bremen, from which it obtains most of its tobacco. It has quayage with depth alongside up to 30 feet, and a dry dock 410 feet long. Malmö, from its situation, naturally has a large trade with Denmark and Germany. Halmstad, on the Kattegat, is a rising port. On the Baltic and its arms, the chief seaports besides Stockholm are Gavle, Oxelösund, Norrköping, Kristianstad, Söderhamn, Sundsvall, Härnösand. Only ruins still testify to the former commercial importance of Visby, on the island of Gotland.

Nearly all the towns in Norway of any importance are seaports. The chief are Oslo (with a dry dock capable of accommodating vessels of 15,000 tons) and Bergen ; among the others are Drammen, the great centre for wood-pulp and paper, Tönsberg, Kristiansand, Stavanger, Kristiansund, Trondheim (formerly Trondhjem or Nidaros), and in the far north Tromsö and Hammerfest. The wooden shipping of Norway is still important. This seems only natural when we consider the abundance of timber for building-material, the large quantities of bulky produce (timber, ice, salt fish, stones, ores) for which low freights are a matter of importance, the large number of good and constantly open harbours on the coast inviting to a seafaring life, and the scantiness of the means of subsistence on the land, of which there is so small an area available for cultivation ; indeed, one-sixth of the population of Norway lives on the islands. The sailing fleet culminated in 1879 with a tonnage of 1½ million tons, and has been steadily decreasing since. The total tonnage of the merchant navy of Norway is about 2 million tons.

During the Middle Ages, when the Baltic trade was exceptionally important, two Scandinavian islands, Gotland and Bornholm (the latter now in the kingdom of Denmark), became great distributing centres, and both maintained relations with the Byzantine Empire by way of the Black Sea. This trade, in the hands of Scandinavians, attained a special degree of importance at the most flourishing period of the *vikings*, or ' men of the bays,' in the tenth and eleventh centuries, when Constantinople was well known to the Norsemen by the name of Myklagaard, or ' the great city.' The trade that passed thence by way of Russian rivers converged on Visby in Gotland, which retained its importance in subsequent times during the domination of the Hanseatic League, of which Visby was one of the leading members. The trade that converged on Bornholm passed down the Oder and its tributaries, and any products of the regions round the Black Sea that followed that route must have been carried up the Danube to the west of Hungary and then to the Oder through the Moravian Gate. The insular position of the two centres of trade mentioned in this paragraph was no doubt determined by considerations of safety, which have so often led to the selection of island *entrepôts* elsewhere.[1]

SPITSBERGEN

This group of islands, somewhat more than 30,000 square miles in extent, formerly a no man's land, was placed in December 1919 by the Council of the League of Nations under the sovereignty of Norway, from which it is distant about four hundred miles. Norway took formal possession in 1925. It has lately attracted attention on account of its mineral wealth. It has extensive deposits of coal of various geological ages and of different qualities, including both steam coal (some of it stated to be equal to the best Welsh) and house coal; but in addition to coal it has bituminous shales, magnetic and other iron ores, copper, lead, and coloured marbles. So far only the coal has been worked—by owners of different nationality, British, Norwegian, Swedish, Russian. The total export of coal increased from 15,000 tons in 1909 to about 90,000 in 1919. The export increased to 440,000 tons in 1924—all of it tertiary coal —and now averages about a quarter of a million tons, including the output from Bear Island.

[1] In ancient times, Aradus, Tyre (according to Condor as early as the fourteenth century B.C.), Rhodes, Utica (originally), Gades (now Cadiz—originally on an island, though connected with the mainland since Roman times); in modern times Ormuz, Bombay, Hong Kong, Singapore, Diu, &c.

NORWAY[1]

GENERAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29[2]	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. Corn and meal	1·81	2·01	2·88	3·52	6·09	21·2	17·4	17·6	15·9	11·9	10·0
Rye and meal	*1·18*	*1·14*	*1·49*	*1·49*	*2·00*	*13·9*	*9·8*	*9·1*	*7·5*	*5·0*	*3·6*
Wheat and meal	*0·18*	*0·38*	*0·50*	*0·81*	*1·24*	*2·1*	*3·2*	*3·0*	*3·3*	*2·7*	*2·2*
Barley	*0·36*	*0·40*	*0·59*	*0·67*	*0·32*	*4·2*	*3·4*	*3·6*	*3·3*	*2·3*	*0·6*
2. Iron and steel and wares	0·50	0·78	1·56	1·54	2·00	5·8	6·7	9·5	8·3	5·2	3·6
3. Coal, coke, &c.	0·31	0·74	1·34	2·29	3·52	3·7	6·3	8·2	7·5	7·7	6·3
4. Woollens	0·60	0·63	0·54	0·94	1·72	7·0	5·3	3·3	2·8	3·2	3·1
5. Machinery and locomotives	0·14	0·26	0·38	1·37	2·45	1·6	2·2	2·3	3·8	4·6	4·4
6. Hides, skins, leather, &c.	—	0·30	0·41	0·87	1·57	—	2·5	2·5	3·0	2·9	2·8
7. Cottons	0·29	0·35	0·43	0·92	2·27	3·4	3·0	2·6	2·8	3·1	4·1
8. Coffee	0·54	0·73	0·49	0·88	1·80	6·4	6·2	3·0	2·7	3·0	3·2
Average total value	8·54	11·73	16·39	29·68	55·72						

Principal Countries.[3]	Percentages. '72–75	'91–95	'01–05	'11–13	'25–29
1. Germany	25·5	26·7	27·5	30·4	21·3
2. United Kingdom	30·2	27·8	25·5	26·0	20·5
3. Sweden	7·3	13·6	10·3	10·8	8·0
4. United States	—	4·9	4·1	6·4	12·9
5. Russia and Finland	8·8	8·9	10·7	5·2	1·2
6. Denmark	12·2	4·9	6·2	4·8	6·5
7. Netherlands	3·4	4·0	4·7	3·6	5·3
8. Belgium	1·6	3·7	4·1	2·9	3·4
9. France	5·1	2·4	1·6	2·4	2·9
Average total value	9·26	11·73	16·39	29·68	55·72

SPECIAL[4] EXPORTS EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29[2]	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. Fish	1·89	2·17	2·62	5·01	7·72	32·0	31·5	27·5	25·5	21·1	19·6
Cod, dried	*0·89*	*1·34*	*1·35*	*2·34*	*3·09*	*15·1*	*19·5*	*14·2*	*13·4*	*11·3*	*7·9*
Herring, salt	*0·88*	*0·52*	*0·59*	*0·75*	*0·93*	*15·0*	*7·5*	*6·2*	*4·5*	*3·6*	*2·5*
2. Wood	2·45	1·57	2·10	1·84	2·38	41·5	22·6	22·0	16·9	8·9	6·0
3. Wood pulp	—	0·72	1·37	2·06	5·67	—	10·4	14·4	15·6	12·8	14·4
4. Printing paper	—	—	0·21	0·78	} 5·23	—	—	2·2	4·1	3·8	} 13·3
5. Packing paper	—	0·20	0·32	0·62		—	2·8	3·3	3·6	3·0	
6. Condensed milk	—	—	0·34	0·45	0·50	—	—	3·6	3·1	2·2	1·3
7. Hides and skins	—	—	0·21	0·60	0·58	—	—	2·2	3·1	2·9	1·5
8. Train oil	0·32	0·34	0·33	0·68	1·12	5·4	4·9	3·4	2·6	3·3	2·8
9. Sulphur	0·06	0·03	0·15	0·45[6]	—	0·9	0·5	1·5	2·2	2·2	—
10. Calcium carbide	—	—	0·05	0·44	0·33	—	—	0·5	2·1	2·1	0·8
11. Vessels	—	—	0·21	0·25	0·98	—	—	2·2	1·4	1·2	2·5
Average total value	5·90	6·91	9·51	20·79	39·36						

GENERAL[5] EXPORTS

Principal Countries.[3]	Percentages. '72–75	'91–95	'01–05	'11–13	'25–29
1. United Kingdom	30·4	34·4	40·3	29·0	28·1
2. Germany	16·8	12·2	13·5	23·4	11·9
3. United States	—	1·1	1·5	16·4	10·5
4. Sweden[7]	11·2	15·7	8·0	6·9	7·8
5. France	9·2	5·9	4·4	4·2	5·1
6. Belgium	2·7	3·5	3·9	4·0	4·0
7. Russia and Finland	4·7	2·9	2·9	4·0	2·3
8. Netherlands	6·6	4·7	7·8	5·0	2·3
9. Spain	7·3	9·8	6·2	3·4	1·9
10. Denmark	5·8	3·5	4·3	2·9	3·9
Average total value	6·26	7·36	10·56	20·17	40·00

[1] 'Official values' revised annually. Direct transit is included in totals of exports and imports and in articles for 1911 and 1912, but excluded from 1913 figures.
[2] The average rate of exchange for 1925–29 is 19·9 kroner = £1 sterling. [3] Countries of consignment from 1909; previously countries of shipment.
[4] General exports, 1871–75. [5] Special exports, 1911–13. [6] Figures for 1911–12 only. [7] Values before 1909 incomplete.

NORWAY [1]

GENERAL IMPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Foodstuffs	*33·1*	*24·9*	*22·9*		
Fruit and products of	3·3	3·4	3·8		
Wheat and wheat flour	3·5	3·9	3·5		
Maize	1·7	1·8	1·8		
Rye	3·3	2·7	1·6		
Coffee	2·8	3·0	2·5		
Sugar	3·2	2·2	2·3		
Fatty oils (vegetable)	2·3	2·0	1·2		
Raw materials	*28·3*	*24·8*	*28·3*		
Coal, coke, and cinders	7·6	6·1	6·5		
Other minerals and ores	2·4	4·2	4·6		
Petroleum oils	2·6	2·5	3·4		
Fodder and seeds	2·7	2·0	2·4		
Manufactures	*37·4*	*49·9*	*47·7*		
Iron and steel	6·9	5·9	7·5		
Other metals and manufrs.	—	2·3	3·8		
Ships	2·6	11·4	7·2		
Machinery	2·8	4·9	6·6		
Yarns and rope	2·3	2·8	3·8		
Woollen goods	3·5	3·3	3·1		
Cotton goods	4·2	4·1	3·6		
Other textiles	4·0	3·9	4·1		
Chemicals and manures	—	1·7	2·5		
Vehicles	—	2·0	2·3		
Total value in 1,000 million kroner	*1·52*	*1·05*	*0·76*		
Countries:					
United Kingdom	21·9	21·1	22·2		
Germany	23·0	21·5	20·4		
Sweden	6·8	8·3	9·7		
United States	16·7	12·0	8·1		
Denmark	6·7	6·6	5·9		
Netherlands	4·9	5·0	3·9		
Belgium	3·4	3·4	3·2		
Argentina	2·3	2·8	3·2		
France	2·4	2·8	3·3		
Russia	0·3	1·4	2·4		
Poland and Danzig	—	1·5	2·3		

Par rate of exchange, 18·159 kroner = £1. (Approximately correct, 1931–35.)

NORWAY

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Foodstuffs	*33·5*	*28·2*	*25·1*		
Dried fish	7·3	7·9	5·8		
Tinned fish	4·7	6·3	5·3		
Animal fats	5·3	4·3	3·1		
Fresh fish	1·1	3·5	2·7		
Salted herring	4·2	2·5	1·9		
Raw materials	*45·7*	*47·6*	*52·4*		
Woodpulp	19·1	12·8	12·7		
Nitrate of lime	4·8	4·4	7·5		
Aluminium	4·1	5·4	4·8		
Fish oil	2·6	2·9	3·9		
Timber	8·7	5·5	2·6		
Fish and whale meal	0·5	2·2	2·4		
Zinc	0·2	0·5	2·3		
Ferro-manganese	—	2·4	1·5		
Iron pyrites	1·6	2·0	1·4		
Manufactures	*20·6*	*24·0*	*21·3*		
Paper	14·1	12·7	10·1		
Ships	2·5	2·9	2·3		
Total value in 1,000 million kroner	*1·04*	*0·71*	*0·55*		
Countries:					
United Kingdom	30·6	26·9	25·0		
Germany	9·4	12·2	12·6		
United States	13·5	10·0	9·3		
Sweden	5·3	5·9	7·0		
France	6·4	4·9	5·5		
Denmark	5·0	4·1	4·2		
Russia	0·8	2·3	3·8		
Netherlands	1·6	2·6	3·5		
Belgium	3·1	4·0	3·3		
Italy	2·4	2·4	2·6		
Japan	—	2·3	2·5		
Spain	2·1	1·9	2·4		

Towns of Norway, 1930

Oslo (formerly Christiania)	253,000	Trondheim	54,000
Bergen	98,000	Stavanger	47,000

SWEDEN[1]

SPECIAL IMPORTS[2]

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29[3]	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. Coal and coke	0·73	1·65	3·26	1·14	5·83	5·7	8·5	11·1	10·3	10·1	6·6
2. Wheat, rye, and meal	*1·00*[3]	1·65	2·19	2·15	1·21[9]	7·5[3]	8·5	7·5	5·9	5·1	1·4
3. Iron and steel and mnfrs.	—	0·78	1·47	2·21	4·03	—	4·0	5·0	5·0	5·3	4·5
4. Coffee	0·83	1·47	1·21	2·16	4·14	6·3	7·6	4·1	4·1	5·1	4·7
5. Machnry. & locomotives	0·61	0·60	1·11	1·51	4·22	4·8	3·1	3·9	4·4	3·6	4·8
6. Raw cotton	0·59	0·60	0·86	1·40	2·13	4·5	3·1	2·9	3·4	3·3	2·7
7. Skins, dressed and raw	0·51	0·54	0·86	1·65	1·38	3·9	2·8	2·9	3·2	3·9	1·6
8. Mineral oil	0·14	0·37	0·76	1·32	3·94	1·1	1·9	2·6	3·1	3·1	4·5
10. Raw wool	0·35	0·27	0·68	0·95	1·56	2·7	1·4	2·3	2·4	2·2	1·8
11. Oil, non-mineral	0·11	0·27	0·44	0·72	2·03	0·8	1·3	1·5	2·2	1·7	2·3
12. Woollens	0·90	1·12	0·65	1·13	1·60	6·8	5·8	2·2	1·9	2·7	1·8
13. Wood and manufactures.	—	0·25	0·27	1·00	0·58[10]	—	1·3	0·9	1·6	2·3	1·0
Sugar, raw and refined	0·85	0·39	0·09	0·03	1·61	6·5	2·0	0·3	0·1	0·1	1·9
Average total value	13·20	19·42	29·31	42·58	88·10						

Principal Countries.[4]	Percentages. '71–75	'91–95	'01–04	'11–13	'25–29
1. Germany	22·6	33·3	28·1	31·7	29·9
2. United Kingdom	33·0	27·1	26·4	24·0	17·0
3. United States	2·2	3·3	2·1	8·2	11·2
4. Denmark and Iceland	15·9	11·7	12·7	6·5	7·8
5. Russia and Finland	8·0	7·7	6·0	6·4	1·6
6. France	3·3	2·4	1·8	1·4	3·4
7. Norway	5·3	8·9	4·5	3·0	2·9
8. South America	—	—	0·4	1·1	5·8
9. Netherlands	5·7	2·1	2·8	2·6	4·0
10. Belgium	2·1	2·9	3·1	1·6	1·9
Average total value	13·60	19·31	28·96	42·58	88·10

SPECIAL EXPORTS[2]

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29	Percentages of Total Value. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. Wood	1·71	6·28	8·12	9·21	16·11	12·1	35·6	35·6	30·1	22·5	18·7
2. Wood pulp	0·08	0·57	1·88	5·09	11·66	0·6	3·2	8·2	11·1	12·4	17·0
3. Iron (pig, bar, blooms)	2·18	1·59	2·10	—	4·02	19·5	9·0	9·2	9·0		4·7
4. Butter	0·34	2·13	2·01	2·96	2·85	3·0	12·1	8·9	7·3	7·2	3·3
5. Iron ore	—	0·21	1·14	3·20	6·68	—	1·3	5·0	6·4	8·0	7·9
6. Paper	0·13	0·98[6]	1·07	2·13	7·57	1·1	5·5	4·7	5·7	5·2	8·8
7. Machinery	—	0·22	0·81	3·37	9·86	—	1·3	3·6	5·2	8·2	11·4
8. Iron and steel wares[7]	—	0·30	0·68	1·02	3·12	—	1·7	3·0	2·9	2·5	3·6
9. Matches	0·20	0·48	0·45	0·80	2·52	1·8	2·7	2·0	2·2	1·9	2·9
10. Fish, fresh and salted	—	0·77[6]	0·22	0·56	—	—	4·4	1·0	1·6	1·4	—
15. Oats	1·57	0·78	0·06	0·17	1·09	14·1	4·4	0·3	0·2	0·4	1·3
Average total value	11·18	17·65[6]	22·80	44·14	86·01						

Principal Countries.[4]	Percentages. '71–75	'91–95	'01–04	'11–13	'25–29
1. United Kingdom	52·9	44·1	38·2	29·1	26·3
2. Germany	7·0	13·4	16·6	21·6	14·6
3. Denmark and Iceland	10·9	12·2	13·8	9·1	6·5
4. France	9·7	8·8	7·2	7·5	5·6
5. Norway	3·5	5·3	6·1[8]	6·1	5·0
6. Russia and Finland	3·0	3·3	3·4	5·5	4·9
7. Netherlands	2·8	5·2	6·0	2·8	3·8
8. Belgium	1·4	3·4	3·8	2·5	2·8
9. Spain	1·1	1·3	1·0	1·4	2·5
10. Australia	—	0·2	0·2	1·2	1·6
Average total value	11·36	17·68	22·25[5]	44·44	86·01

1 'Official values' revised annually until 1913 inclusive, now 'declared values' for 80 per cent. of articles.
2 Bullion and specie excluded for articles, included for countries, except after 1910.
3 Rate of exchange 18·1 kronor = £1.
4 Countries of consignment from 1905, formerly countries of shipment.
5 Excluding wheat.
6 The diminution in the value of the exports for 1894 is stated to be largely owing to a revaluation of the units of value, value per 1,000 kg. of fish reduced from 207 kr. to 92 kr., of paper from 136 kr. to 25 kr.
7 Including plates and wire.
8 The exports to Norway are understated by about one million sterling annually, 1898–1901, owing to abrogation in 1898 of the special law regulating the trade between Sweden and Norway.
9 Wheat and maize.
10 Timber, round or sawn.

SWEDEN

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*24·8*	*22·8*	*19·9*		
Raw coffee	4·4	4·4	3·8		
Fruits and garden produce	3·6	4·2	4·7		
Wheat	9·4	2·9	0·9		
Other cereals		3·1	2·1		
Raw materials	*36·4*	*32·9*	*33·7*		
Coal and coke	8·7	6·7	8·4		
Mineral oils	3·2	4·0	5·0		
Base metals (raw)	1·6	2·9	3·2		
Cotton (raw and waste)	3·8	2·5	2·4		
Iron and steel (bar, &c.)	1·8	2·1	2·3		
Fatty oils and fats	1·2	2·2	2·0		
Manufactures	*37·4*	*43·4*	*44·7*		
Chemicals	1·6	2·4	4·9		
Woollen goods	3·6	3·5	3·6		
Cotton goods (yarns and textiles)	2·0	2·7	3·0		
Other textiles	5·1	7·5	6·9		
Iron and steel manufrs.	5·1	2·7	3·1		
Machy. and appar., elec.	—	1·8	2·9		
,, ,, ,, other	2·5	3·4	3·5		
Other metal manufrs.	—	2·0	1·8		
Cars	2·3	2·5	1·4		
Total value in 1,000 million kronor	*1·44*	*1·64*	*1·29*		
Countries:					
Germany	24·8	31·1	28·4		
United Kingdom	21·6	16·2	15·5		
United States	16·0	13·9	11·6		
Denmark	8·7	7·2	6·1		
Netherlands	4·0	4·0	4·1		
Norway	2·7	2·9	3·3		
Poland	—	2·1	3·2		
France	3·1	3·4	3·0		
Argentina	3·3	2·7	2·6		
Belgium	1·8	1·9	2·4		
Brazil	2·7	2·7	2·3		

Par rate of exchange, 18·159 kronor = £1. (Approximately correct, 1931–35.)

SWEDEN [1]

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*5·6*	*9·4*	*7·7*		
Butter	1·4	3·6	2·8		
Bacon, hams, and pork	2·1	2·5	2·2		
Raw materials	*51·3*	*48·8*	*44·6*		
Wood pulp	17·8	17·2	19·8		
Timber	19·5	16·2	14·4		
Iron ore	6·5	7·7	5·0		
Manufactures	*38·5*	*41·2*	*46·0*		
Paper and cardboard	9·7	8·6	10·8		
Machy. and apparatus	2·9	10·0	9·1		
Iron and steel	7·4	7·0	8·7		
Other metal manufrs.	—	1·8	2·4		
Ball and roller bearings	1·3	1·9	2·3		
Matches	3·3	2·8	1·8		
Total value in 1,000 million kronor	*1·31*	*1·48*	*1·15*		
Countries:					
United Kingdom	28·5	26·0	25·7		
Germany	10·6	14·5	11·8		
United States	12·0	11·0	11·3		
Denmark	6·6	6·4	6·6		
France	7·3	5·5	6·4		
Norway	4·9	5·2	5·9		
Netherlands	3·8	3·7	3·5		
Finland	2·2	2·9	2·9		
Belgium	3·3	2·7	2·8		
Spain	2·7	2·4	2·3		
Russia in Europe	3·5	1·9	1·9		

TOWNS OF SWEDEN, 1935

Stockholm	526,000	Norrköping	63,000
Göteborg	255,000	Hälsingborg	58,000
Malmö	139,000		

The islands belonging to this kingdom, namely Seeland (*Danish* Sjælland), Fyen (*Danish*: Fyn), Laaland, Falster, &c., between the Kattegat and the Baltic, are for the most part fertile and well peopled. The eastern half of the peninsula of Jutland (*Danish*: Jylland) likewise contains much fertile land and numerous good seaports, but the western half is less fertile. In western Jutland 67 per cent. of the area is cultivated, in eastern Jutland 77 per cent., in the Danish islands 78 per cent. Western Jutland is bordered by a line of dangerous sand-dunes, and is without any good seaport, though the port of Esbjerg, in the south-west, maintains the trade in bacon, butter, and eggs with Great Britain. The channels separating the Danish islands necessarily interrupt to some extent the railway communication, but the railway trains are ferried across the channels between Fyen and Seeland, between Seeland and Sweden, between Seeland and Falster, and between Falster and Germany. At Aalborg there is a bridge across the Limfiord, replacing the former train-ferry, and a great bridge between Jutland and Fyen was constructed in 1930–35.

The table of exports given below shows that Denmark is essentially an agricultural and especially a cattle-rearing country. The success of its agriculture is undoubtedly due in a large measure to the high state of education of the farmers and to the co-operation among farmers. The government encourages in every way agricultural education. The importance of butter among the exports has made the Danish legislature jealous of the reputation of this commodity, so that it has empowered the Minister of the Interior to forbid the exportation of artificial butter whenever he shall find it necessary. Denmark is naturally similar in general character to the northern plain of Germany, a country of poor glacial soils. Denmark has been transformed into a rich agricultural country solely through the determination and energy of the people. The import table shows how largely Denmark is dependent on foreign manufactures, but the interest taken in the development of local manufacturing industry is shown by the flourishing condition of the Copenhagen Institute for the Encouragement of Danish Industry. During a large part of the year the institute holds monthly exhibitions, allotting free space to exhibitors, and promotes Danish industry in

other ways. The chief Danish manufacturing industries are cement manufacture, brewing, and shipbuilding. Cement, beer, ships' motors, and art porcelain are all produced for export.

A country like Denmark cannot be expected to have many large towns, and Copenhagen has a population about ten times as large as any other in the country. Besides being the capital, it is the chief seat of industry and commerce. The Sound, on which it stands, is the shortest route between the Baltic and the Kattegat, and hence the site of the town—partly on the mainland of Seeland, partly on the smaller island of Amager—is well suited for a ' merchants' haven ' (*Danish* : Kjöbenhavn). Since 1894 Copenhagen has been provided with a free port, the harbour belonging to which has a depth up to 30 feet. This port is connected with Malmö in Sweden by excellent train-ferry steamers, and the traffic has grown with great rapidity. In 1895 the tonnage of the vessels visiting the port was 260,000 tons; in 1900, 791,000 tons; in 1911, 3,380,000 tons, of which 1,720,000 tons were cargo ; in 1928, 5,600,000 tons. Elsinore (Helsingör), at the northern end of the Sound, is of little importance since the Danish tolls collected here on vessels passing through the Sound were abolished by international agreement in 1857. Vessels of the largest size have to make use of the Great Belt (between Seeland and Fyen), the deepest of the channels connecting the Baltic and the Kattegat.

The chief Danish ports on the east of Jutland are Aarhus and Aalborg, the latter on the Limfiord. The chief port of Fyen is Odense.

The **Faroe Islands** north-west of Scotland are dependencies of Denmark, and the larger island of **Iceland** still acknowledges personal union with Denmark through having the same king, although its legislature was made independent by an Act which came into operation on December 1, 1918. The inhabitants of both maintain themselves chiefly by sheep-rearing, fishing, and the collecting of eggs and eider-down. Salt-fish, cod-liver oil, and dairy produce are also exported. The inhabitants of Iceland are only about 110,000 in number, or about 2·7 to the square mile. The chief seaport of the island is Reykjavik, on the southern part of the west coast.

TOWNS OF DENMARK, 1935

Copenhagen (with suburbs)	831,000	Odense	74,000
Aarhus	89,000	Aalborg	47,000

DENMARK[1]

GENERAL[2] IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1886–90	'96–00	'06–09	'11–13	'25–29[5]	Percentages of Total Value. '86–90	'96–00	'06–09	'11–13	'25–29
1. Grain	1·36	2·89	4·41	3·98	9·87	9·1	11·4	10·8	9·1	10·6
2. Oil-cake	0·33	0·88	3·09	3·68	7·54	2·2	3·5	7·5	8·4	8·2
3. Coal, coke, &c.	1·03	1·73	2·65	3·43*	6·07	6·8	6·8	6·5	7·9*	6·5
4. Iron and steel manufactures	0·96	1·77	2·67	2·42	3·78	6·4	7·0	6·5	5·5	4·1
5. Wood and manufactures	0·89	1·39	1·91	2·36*	3·74	5·9	5·5	4·7	5·4*	4·0
6. Seeds	0·50	0·62	1·42	1·63	5·15	3·4	2·5	3·5	3·7	5·6
7. Wool manufactures[3]	1·05	0·98	1·28	1·13	3·03	7·0	3·8	3·1	2·6	3·3
8. Cotton, flax, hemp manufactures[3]	0·55	0·77	1·13	1·05	—	3·6	3·0	2·8	2·4	—
9. Oil	0·26	0·40	0·76	—	3·02	1·7	1·6	1·9	—	3·3
10. Coffee	0·61	0·83	0·78	0·99	2·54	4·1	3·3	1·9	2·3	2·7
12. Lard and fat	0·26	0·46	1·55	0·53	—	1·7	1·8	3·8	1·2	—
16. Sugar	0·30	0·34	0·39	0·17	—	2·0	1·3	1·0	0·4	—
18. Butter	0·54	1·70	1·67	0·27	—	3·6	6·7	4·1	0·6	—
Average total value	14·98	25·35	40·99	43·68*	92·72					

Principal Countries.	Percentages. '86–90	'96–00	'06–09	'11–13	'25–29
1. Germany	34·6	30·1	33·4	38·2	31·8
2. United Kingdom	22·9	20·3	15·9	16·2	13·3
3. Sweden	13·9	11·4	8·3	8·7	6·4
4. United States	5·4	12·5	15·3	9·2	14·4
5. Russia	7·8	8·6	10·3	7·1	1·8
6. E. Ind., China, &c.	0·7	0·8	1·1	—	3·0
7. France	2·2	2·4	2·3	2·4	3·8
8. Netherlands	2·6	2·1	2·8	2·6	3·9
9. Belgium	2·4	1·6	1·4	1·3	2·3
10. Norway	2·1	1·6	1·6	1·1	1·7
11. Iceland	0·8	0·5	0·8	0·9	0·3
Average total value	14·98	25·35	40·99	43·68	97·20

EXPORTS,[4] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1886–90	'96–00	'06–09	'11–13	'25–29[5]	Percentages of Total Value. '86–90	'96–00	'06–09	'11–13	'25–29
1. Butter	2·95	5·96	9·64	10·43	27·11	27·2	42·8	41·0	27·9	31·3
2. Meat	1·24	3·36	6·04	9·12	27·62	11·4	24 1	25 7	24·4	31·8
3. Animals	2·17	1·21	2·23	3·40*	3·83	20·0	8·7	9·5	9·1*	4·4
Cattle	*1·07*	*0·56*	*1·42*	*2·30*	*3·56*	*9·8*	*4·0*	*6·0*	*6·2*	*4·1*
Horses	*0·56*	*0·64*	*0·81*	*1·09*	*0·27*	*5·1*	*4·6*	*3·4*	*2·9*	*0·3*
4. Eggs	0·28	0·79	1·47	1·65	5·23	2·6	5·7	6·2	4·4	6·0
5. Hides and skins, raw	0·44	0·36	0·70	0·79	1·07	4·0	2·6	3·0	2·1	1·2
6. Fresh fish	0·29	0·20	0·40	0·53	1·36	2·7	1·4	1·7	1·4	1·6
7. Barley	0·35	0·26	0·28	0·57	0·70	3·3	1·9	1·2	1·5	0·8
8. Iron and steel manufactures	0·14	0·10	0·27	0·19	1·41[6]	1·3	0·7	1·1	0·5	1·6
9. Lard and fat	0·15	0·05	0·18	0·25	2·25[7]	1·4	0·4	0·8	0·7	2·6
10. Wheat and wheat flour	0·43	0·11	0·08	0·11	—	4·0	0·8	0·3	0·3	—
Average total value	10·85	13·92	23·52	37·38	86·68					

Principal Countries.	Percentages. '86–90	'96–00	'06–09	'11–13	'25–29
1. United Kingdom	52·5	59·6	53·1	55·8	56·3
2. Germany	25·2	18·5	21·3	25·5	20·1
3. Sweden	10·7	9·1	7·8	4·8	6·8
4. Russia	1·3	4·7	5·8	2·5	0·2
5. Norway	3·7	3·0	3·1	2·7	3·9
6. United States	1·1	1·2	4·6	1·2	0·8
7. Iceland	1·3	0·9	0·7	0·7	0·9
8. Netherlands	0·5	0·1	0·3	0·6	0·7
9. France	1·0	0·4	0·2	0·5	0·7
10. Belgium	0·7	0·3	0·3	0·4	0·3
11. East Indies, China	—	0·1	0·7	—	0·2
12. Greenland	0·5	0·3	0·2	0·2	—
Average total value	10·85	18·85	33·19	37·38	89·40

[1] 'Official values' determined annually.
[2] 'General imports' till 1909, thereafter special imports in the case of articles except for those marked *, which are 'general'; 'general imports' exclusive of transhipments in the case of countries.
[3] Exclusive of ready-made goods; figure for 1924 represents manufactures from cotton, flax, hemp, and other vegetable stuffs.
[4] In the case of articles, special exports throughout; in the case of countries, general exports prior to 1910, then general exports excluding transhipments.
[5] Exchange 18 K. = £1. [6] Metal manufactures. [7] Lard and vegetable oils.

DENMARK [1]

SPECIAL IMPORTS

	Percentages of Total Value.		
	1923.	1926–30.	1931–35.
Foodstuffs	*23·6*	*21·0*	*21·0*
Wheat and flour	3·1	3·4	3·2
Maize	3·8	4·0	2·5
Rye	2·4	1·9	1·5
Other cereals	—	1·6	1·7
Coffee	2·0	2·6	2·1
Raw materials	*42·6*	*38·8*	*37·3*
Oil-seeds	5·7	5·9	5·3
Coal and briquettes	6·6	4·9	5·3
Coke and cinders	2·0	1·7	2·4
Oil-cake	5·1	7·1	5·1
Other fodder	—	2·1	1·1
Mineral oils	—	3·3	3·5
Pinewood	3·7	2·7	2·9
Nitrates	1·8	2·0	1·9
Manufactures	*33·4*	*39·7*	*41·4*
Vehicles and machines	2·4	6·7	6·5
Vegetable textiles	—	4·4	4·2
Apparel, hats	2·2	4·1	2·8
Woollen goods	2·5	3·3	3·4
Yarn and twine	—	2·0	2·4
Iron manufactures	2·2	2·8	3·5
Iron and steel manufactures		2·0	2·0
Total value in 1,000 million kronen	*2·22*	*1·63*	*1·38*
Countries:			
Germany	32·0	32·3	25·1
United Kingdom	20·1	13·5	24·3
Sweden	5·7	6·6	6·6
United States	12·5	13·8	7·1
Netherlands	2·8	3·9	3·9
U.S.S.R.	1·4	2·1	3·3
France	3·0	3·8	2·9
Belgium	2·0	2·3	2·6
Argentina	1·5	1·8	2·3
Norway	2·0	1·8	2·1
China	1·4	2·0	2·1

Par rate of exchange, 18·159 kronen = £1; 1932–35 approximately 22·4 kronen.

DENMARK

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Livestock	*7·0*	*5·0*	*2·1*		
Cattle	3·6	4·3	2·4		
Foodstuffs	*77·7*	*76·5*	*82·0*		
Bacon	28·9	30·5	34·4		
Other meats	1·3	2·2	3·2		
Butter	32·8	30·5	20·7		
Eggs	8·2	5·9	6·9		
Fresh fish	1·0	1·7	2·6		
Raw materials	*5·2*	*6·5*	*6·9*		
Vegetable oils	1·9	2·1	2·5		
Seeds and fodder	—	1·5	2·4		
Manufactures	*10·1*	*12·1*	*8·9*		
Vehicles and machinery	2·5	4·7	3·7		
Ships	1·1	2·3	1·9		
Total value in 1,000 million kronen	*1·98*	*1·46*	*1·18*		
Countries:	1923.				
United Kingdom	63·1	56·8	61·6		
Germany	6·2	19·3	14·2		
Sweden	7·8	6·7	5·9		
Norway	4·5	4·1	3·6		
Belgium	1·2	0·5	2·3		

Classes 1931–33 only.

SPAIN AND PORTUGAL

The Iberian Peninsula, which is made up of the two countries named at the head of this chapter, has, with the islands belonging to these two countries, an area rather less than twice as large as that of the British Isles, but a population only about three-fifths as great as that of these Islands. The population is chiefly settled round the circumference of the peninsula, so that there remains a large area in the interior with an average density about equal to that of the least densely peopled counties of Scotland.

This low density of population is partly explained by the character of the surface. Till 1912 the Pyrenees were crossed by railways only at their ends, and there a difference of gauge between the French and Spanish lines is still maintained as a defensive precaution. The Pyrenees are continued westwards by the Cantabrian and Asturian Mountains ; and though the coast on the north is populous and rich in seaports, only five of these seaports, including Corunna, are connected with the interior by rail. A distance of about 43 miles lies between the crossing-places of the two railways through the Basque provinces, namely that which goes to the port of St. Sebastian and thence to the French frontier, and that which goes to the port of Bilbao. There is an interval of 62 miles in a direct line between the crossing-place of the latter line, and of that to the port of Santander, a further interval of 81 miles to the crossing-place of the line to Gijon, and one of 84 miles to that which enters Galicia by the valley of the Sil, and then divides, sending out one branch along the Minho, and another north and north-west to Corunna.

South of these mountains the greater part of the peninsula is occupied by a tableland, with an average height of about 2,700 feet in its northern, and about 2,600 feet in its southern half, and this tableland is bordered everywhere except in the west, by mountains and steep slopes presenting obstacles to railway construction, while the rarity of the population, and in many parts the absence of natural resources, hold out little prospect of remunerative returns on works necessary to overcome these obstacles.

The rivers of the peninsula, though of considerable length (three of them from two to three times as long as the Thames from its source to the Nore), add little to the means of communication. They are for the most part too much obstructed by shallows and

rapids to be navigable for any great distance, and as their beds lie mostly in deep valleys below the level of the tableland, they cannot advantageously be connected by canals. The Minho is navigable for but a short distance above its mouth. The Douro is navigable to the Portuguese frontier, but only by small craft; and a bar at its mouth, crossed only by a narrow, shallow, shifting, and dangerous channel, generally prevents vessels of more than 18 feet draught from ascending even to Oporto. The navigation of the Tagus ends within the Portuguese frontier, and that of the Guadiana only a few miles above the point where it begins to form the frontier between the two countries of the peninsula. The Guadalquivir is the most important of all the rivers of the peninsula as regards navigation. The volume of its water is tolerably constant, being maintained in winter by rain, in summer by the melting of the snows of the Sierra Nevada, the lofty range that borders its basin on the south. It can be ascended as high as Seville by ocean-going steamers, and barge trains go up to Cordoba. The only navigable river on the Mediterranean side is the Ebro, which allows small craft to ascend as high as Logroño, and sea-going vessels to Tortosa. But the lower course of the river can be used by sea-going vessels only during high-water, and a small canal has therefore been cut from Amposta (above the deltaic deposits of the river) to allow of such vessels coming and going at any time. Parallel to the course of the middle Ebro, on its right bank, from a point a little below Tudela to a point about twenty miles below Saragossa, there is a canal, about sixty miles in length, which, though navigable only for vessels of 100 tons burden, is interesting as being, in part at least, one of the oldest canals in Europe. Orders were given for its construction in 1529 by the Emperor Charles V., and it is hence known as the Imperial Canal, but the greater part of it was constructed subsequently to 1768.

The climate is somewhat unfavourable to density of population, as well as the physical features. The total rainfall of the year in by far the greater part of it is less than twenty inches, a higher rainfall being for the most part confined to the north and west coasts. Except along the northern coastlands, such rain as does fall is mostly winter rain, and the height of summer is a period of extreme drought, especially in the southern half of the peninsula. The summer temperature, on the other hand, is high. The whole of the south-east from about the mouth of the Tagus to the eastern extremity of the Pyrenees has at least four months in the year with a mean daily temperature above 68° F., and the whole peninsula, except a comparatively small area in the north-west, has at least eight months with a mean daily temperature of 50° F. or more. The areas belonging to the tableland having the scantiest population are mainly areas of extreme drought and heat—poverty-stricken

steppes, in many places covered with a barren soil, and having little other vegetation than the scanty sprinkling of pale-green grasses, herbs, and shrubs characteristic of such a soil. Snow is rare, though winter temperatures on the plateau are low. During a long period of years the average maximum of snowy days at any station was found to be only 22—at a station on the upper Douro.

One advantage the climate of the Iberian Peninsula has. The prolonged period of high temperature allows of valuable crops being grown in quick succession wherever water can be obtained for irrigation. In some of the plains and valleys at the base of the tableland water has been used for this purpose in the most admirable manner, in some cases since the time of the Romans, in others since that of the Moors. The water of the Ebro is being increasingly turned to account in this way, and that of the Imperial Canal is of more service for irrigation than navigation. The huertas (gardens) of Valencia and Murcia, the former nourished by the waters of the Jucar and Turia or Guadalaviar, the latter by those of the Segura ; the huerta of Elche, in which every drop of the summer waters of the Vinalapo is used up in supplying a grove of date-palms planted by the Moors ; and the 'vega' of Granada, fed by the Jenil, a tributary of the Guadalquivir, are all renowned throughout Europe. A distinction is usually made between the 'vegas' which yield only one crop a year, and the 'huertas' which yield two or more. It is estimated that the total area of irrigated ground in Spain is upwards of 4,400 square miles, more than twice that of the county of Norfolk. By the construction of a large dam on the Noguera Pallaresa near Talarn, about 40 miles north by east Lerida and 80 miles north-west Barcelona, a lake 15½ miles long and 3¾ miles broad was formed, by means of which power is developed and about 100 square miles irrigated. Hydro-electric power, to the extent of over a million horse-power, has been developed in Spain, especially in the Pyrenean region.

In the southern parts the irrigated ground is used for the cultivation of vegetables and garden fruits of all kinds—oranges, mulberries, rice, and in some places for maize. Maize, however, is chiefly grown in the rainier provinces of the peninsula—that is, in northern Portugal and the north-west of Spain, where it forms a staple food of the people. The more fertile parts of the Spanish tableland produce excellent wheat, which became an important export, though in recent years the import of this commodity has often exceeded the export. Among the crops more specially characteristic of Spanish agriculture are chick-peas, onions, and garlic. Oranges, the principal sub-tropical fruit of Spain (chiefly the provinces of Castellon—round Burriana—and Valencia) and Portugal, are confined to land at no great distance from the coast. Figs, almonds, cactuses, pomegranates, and carob-trees are also largely cultivated, and in the

southern provinces even bananas, cherimolias, and other tropical fruits. Under the protection of favourable fiscal laws, the cultivation even of sugar-cane has been attended with no little (though not unmixed) success in the provinces of Granada, Malaga, and Almeria. Wine, wool, and olives in Spain have been previously considered. Cork, the bark of a species of oak which thrives best in a typically Mediterranean climate, but one with a fair proportion of winter rain, is an important product of both Spain and Portugal. The cultivated groves of this tree are chiefly in the extreme north-east and the south-west of Spain and the south-central parts of Portugal. The tree has to stand for thirty years before it yields good cork, and the quality of the cork improves with subsequent strippings, which may be repeated at intervals of about ten years till the tree attains the age, it may be, of 150. Esparto grass, on the other hand, is a wild product of the drier parts of Spain.

The mineral wealth of Spain is very abundant, and has been renowned for ages, though even yet it is far from being fully developed. Iron ore exists in immense quantity in the Basque provinces, and above all in the province of Biscay (Vizcaya). Bilbao, the port from which the ore is dispatched, is one of the most important iron ore exporting seaports on the mainland of Europe. Santander and Murcia rank next in order among the provinces of Spain in the production of iron ore, Cartagena in the latter province being the place of export for valuable ores mined a few miles to the north-east. Large quantities are also mined in the province of Almeria (districts of Almeria and Garrucha) and near Seville, and smaller quantities in that of Malaga (near Malaga and Marbella), and also in that of Lugo in the north-west of Spain, not far from Corunna. All these deposits furnish considerable quantities of ore rich in iron (for the most part from about 48 to 60 per cent.), and sufficiently free from phosphorus to be used in making Bessemer steel by the ordinary process. Many of the Cartagena mines have a poor iron content, but on the other hand they are mostly rich in manganese, and their phosphorus content is uniformly low. The deposits worked near Teruel in eastern Spain and exported from the port of Sagunto, while rich in iron, have a rather high proportion of phosphorus—from 0·06 to 0·39 per cent. The Biscay deposits which have been worked from ancient times downwards, and have long been the most productive, are apparently nearest exhaustion. Other parts of Spain (Leon, &c.) possess iron ores of lower quality which may come to be of importance in the future.

Lead is obtained at Linares, on the outer slopes of the Sierra Morena, south of the Puerto de Despenaperros, and also among the mountains to the north-west of the seaport of Almeria. The great copper-mines are those of Rio Tinto, in the west of Andalusia ; and Huelva, at the mouth of the river, is the place of export. Silver is

found not only associated with lead at Linares, but also in other forms in several other places. Almaden, in the south-west of New Castile, has some of the most important quicksilver (cinnabar) mines in the world. Zinc-blende and calamine are also among the more important Spanish ores. Coal exists in large quantity, and the total area of the coal-fields is estimated at 5,500 square miles, of which about 1,050 square miles belong to the mountainous province of Asturias, or Oviedo, in which are the principal mines. The production is still small. A railway from the centre of the coal-mining region runs to the port of Gijon. Bay-salt is largely produced on the southern coasts of both Spain and Portugal, and rock-salt is also abundant. Near Cardona, in Catalonia, there is an entire mountain of this mineral, and in the same neighbourhood important deposits of potash salts have been ascertained. The bay-salt produced in the lagoon or estuary of the Sado, in Portugal, and exported from Setubal (the St. Ives of English seamen), which stands at the mouth of that estuary, is recognised as some of the best salt in Europe. Phosphorite, a valuable manure, is found in large quantity in Estremadura, and is exported to Portugal.

SPAIN. The situation of the chief seats of Spanish manufacturing industries has been determined more by conveniences for commerce than by local supplies of coal or coal and iron. Barcelona, which has long been the chief seaport of Spain, also takes the lead among the manufacturing towns, as Catalonia, the old province to which it belongs, does among manufacturing provinces. Next in importance to Catalonia in this respect are the Basque provinces, where the existence of several seaports has long maintained an active commerce. The abundance of iron ore has developed a large iron industry, especially at and near Bilbao. The growth of this industry led to an increase in the import of British coal, and as most of the ships that take away the ore still come in ballast, it is to be hoped that this will lead to a still further development of the manufacturing industry and the corresponding import trade. The hydro-electric power from the Cantabrian Mountains is likewise used for driving modern machinery. The smelting and manufacture of iron are also largely carried on in the province of Oviedo in the neighbourhood of the coal supplies, and to that province belongs the government factory of artillery, &c., at La Trubia (a few miles west of the town of Oviedo). The southern seaports of Seville, Malaga, and Cartagena have all risen into important seats of industry of various kinds.

Among locally characteristic industries may be mentioned esparto-plaiting, carried on in the provinces which produce this grass, and silk-spinning and weaving in Valencia and Murcia, where the silk-worm is principally reared. Toledo, on the Tagus (one of the old capitals of Spain), was for very long noted for the sword-blades

which in former times made the name of the city almost the synonym for a sword. The leather industry, so renowned when the Moorish kingdom of Cordova was at the height of its glory, has now declined.

The tables of imports and exports given below show among other things the very considerable importance of the Spanish cotton industry. This is almost entirely concentrated in and round Barcelona, and it is characteristic of the Spanish industry that it is mainly carried on by a large number of comparatively small establishments. The increasing import of machinery is an indication of the industrial development now going on in Spain generally. Spanish commerce as a whole, it will be seen, is, given normal conditions in the country, growing vigorously, even since Spain lost her foreign possessions in 1898. Cuba is no longer an important market for Spanish exports, and Spanish imports from Cuba since 1898 have sunk into insignificance, Cuban sugar, tobacco, metals, &c., now going mainly to the United States.

All the chief seaports are gradually acquiring direct rail or road communication with the interior. Those which have the best natural harbours are Barcelona, Cartagena, Malaga, and the ports on the west coast of Galicia. The harbour of Barcelona, protected by the fort of Montjuich, has been made deep enough to admit the largest vessels, and quays for the accommodation of these have been provided (first in 1755) at the suburb of Barceloneta. The harbour of Tarragona has been artificially formed at some distance from that of its ancient Roman predecessor. The harbour or roadstead of Cadiz, which, together with the position of the town at the entrance to the fertile valley of Andalusia, made this a seaport in the earliest times, is accessible to the largest vessels, though the dock accommodation is defective. The harbour of Huelva, though wide and deep enough to accommodate a large fleet of the largest vessels, is unfortunately obstructed by a shifting sand-bar at the mouth of the Rio Tinto. The opposite port of Palos is historically interesting as the place of departure of Columbus on the voyage in which he discovered the New World. Seville has been made a seaport for large vessels, and is maintained as such only by dredging. All the ports on the north coast are liable to be obstructed by bars, due to the accumulation of sand caused by a current which creeps eastward along the coast. The importance of the port of Bilbao has led to the expenditure of large sums of money to remove this defect. The river Nervion, on which Bilbao stands, has been canalised, and the depth of water on the bar increased, but the navigation channel is narrow and difficult. Improvements at the port of Pasajes (east of San Sebastian) have led to the development of a considerable export trade in coal. Vigo is an excellent and well-situated coaling port serving the north-west.

SPAIN[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1871–75	'91–95	1901–05	'11–13	'25–29[3]	Percentages of Total Value. '71–75	'91–95	'01–05	'11–13	'25–29
1. Raw cotton	3·07	3·26	1·07	1·65	6·72	13·9	9·5	10·1	10·8	8·1
2. Coal and coke	0·69	1·97	2·81	2·61	2·30	3·1	5·8	7·3	6·2	2·9
3. Machinery	0·31	1·21	2·39	3·51	6·56	1·1	3·5	6·1	8·3	8·2
4. Chemicals	0·37	0·77	2·08	2·01	4·79	1·7	2·2	5·3	1·8	6·0
5. Timber & building materials	0·77	1·67	2·16	1·98	4·23	3·5	1·9	5·5	[illegible]	5·3
6. Wheat	—	1·91	2·65	0·91	1·14	—	5·6	6·8	2·1	1·8
7. Fish, salted	0·70	1·04	1·19	1·11	2·11	3·1	3·0	3·0	3·4	3·0
8. Iron & steel & manufactures	0·52	0·86	1·22	1·59	3·62	2·4	2·5	3·4	3·7	1·5
9. Hides and skins, total	0·79	0·73	1·13	1·27	0·74	3·8	2·4	2·9	3·0	0·9
10. Coffee	—	0·57	0·81	0·96	1·76	—	1·7	2·4	2·2	2·2
11. Tobacco, cigars, &c.	0·87	1·11	1·08	0·89[4]	1·10	3·9	1·1	2·6	2·1[4]	5·2
12. Ships	0·61	0·47	0·31	0·95	—	2·9	1·4	0·9	2·2	
13. Cottons	0·25	0·34	0·29	0·51	0·70	1·1	1·0	0·8	1·2	0·9
14. Cacao	0·29	0·55	0·19	0·13	0·71	1·3	1·6	1·3	1·0	0·9
20. Woollens	0·41	0·69	0·11	0·21[4]	0·82	2·0	2·0	1·1	0·6[4]	1·0
Average total value	22·16	34·27	39·07	42·86	80·19					

Principal Countries.[2]	Percentages. '71–75	'86–90	'01–05	'11–13	'25–29
1. United Kingdom	31·1	15·7	18·7	17·1	11·5
2. France	23·1	24·8	15·6	14·3	11·1
3. United States	10·8	11·5	11·8	12·8	18·1
4. Germany	0·6	9·8	9·1	12·6	9·1
5. British Possessions in Asia	—	1·7	1·1	—	1·8
6. Portugal	1·3	1·0	1·4	1·7	0·8
7. Russia (excluding Finland)	0·8	3·0	3·4	3·0	1·1
8. Argentina	1·6	1·1	2·2	1·9	5·8
9. Belgium	2·0	3·5	1·6	3·1	2·7
10. Norway & Sweden	2·9	5·5	2·6	1·4	1·9
11. Philippine Is.	1·3	2·9	1·6	1·1	2·7
12. Switzerland		0·1	1·8	1·1	1·7
13. Chile	7·1	1·7	0·5	0·2	0·5

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'91–95	1901–05	'11–13	'25–29	'71–75	'91–95	'01–05	'11–13	'25–29
1. Iron ore	0·24	1·77	4·56	3·91	1·89	1·2	5·7	12·6	9·8	3·2
2. Lead	1·86	2·07	2·80	2·61	2·81	9·5	6·7	7·7	6·6	1·8
3. Wine	6·26	6·03	2·68	4·33	7·30	31·9	19·4	7·4	10·8	12·4
4. Oranges	0·31	0·86	2·13	2·39	7·01	1·6	2·8	5·9	8·5	11·9
5. Cottons	—	1·66	1·48	1·83	1·85	—	5·3	4·0	1·6	3·2
6. Copper regulus	0·07	0·81	1·42	1·73	1·32	0·3	2·6	3·9	1·4	2·2
7. Cork	0·52	0·95	1·51	1·78	4·09	2·7	3·1	4·2	4·4	7·0
8. Copper ore	0·91	0·94	1·57	0·21[4]	0·63	4·7	3·0	4·3	0·5[4]	1·1
9. Olive oil	0·69	0·68	1·73	1·55	4·33	3·5	2·2	1·8	3·9	7·1
10. Hides and skins (including leather)	0·24	0·31	0·85	0·73	1·52	1·2	1·1	2·3	1·8	2·6
11. Almonds	0·19	0·12	0·72	0·75[4]	2·22	1·0	1·4	2·0	1·9[4]	3·8
12. Raisins	1·07	0·68	0·85	0·62[4]	0·58	5·1	2·2	2·3	1·5[4]	1·0
13. Raw wool	0·30	0·12	0·67	0·68	0·77	1·5	1·4	1·9	1·7	1·3
Average total value	19·60	31·03	36·30	40·06	58·70					

Principal Countries.	'71–75	'86–90	'01–05	'11–13	'25–29
1. United Kingdom	38·6	23·1	31·7	26·4	21·7
2. France	19·1	11·7	21·9	25·7	20·2
3. Cuba	11·3	9·0	7·3	7·1	1·0
4. Germany	1·6	1·8	1·5	6·2	7·1
5. Netherlands	—	1·8	1·8	7·5	1·7
6. Argentina	3·1	2·5	4·1	6·2	5·4
7. United States	4·5	2·2	2·8	5·9	11·1
8. Portugal	6·7	3·8	1·7	1·7	1·5
9. Italy	0·7	1·3	4·3	3·7	5·2
10. Belgium	1·2	1·6	2·9	4·2	3·8
11. Mexico	—	0·8	1·4	1·9	0·7
12. Philippine Is.	0·4	0·7	1·1	0·6	0·9
13. Porto Rico	1·0	1·5	0·5	0·3	—

[1] 'Official values' in normal years revised annually.
[2] From 1890 to 1896 countries of shipment are given instead of countries of consignment.
[3] Exchange rate 31·7 pesetas = £1 sterling.
[4] Years 1911, 1912 only.

SPAIN

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Foodstuffs	—	*17·9*	*16·5*		
Salted fish	4·0	0·9	2·9		
Coffee	1·8	2·4	2·3		
Maize	3·9 [1]	2·8	1·2		
Raw materials	—	*34·1*	*37·4*		
Cotton (raw)	10·2	8·3	11·0		
Other veget. textile fibres	—	2·0	1·7		
Mineral oils, and prods. of	5·6	5·5	5·7		
Timber	4·2	5·1	3·8		
Tobacco and manufrs.	—	3·9	3·2		
Coal and coke	3·5	2·7	2·6		
Silk (raw, spun, and waste)	0·4	2·7	2·1		
Oil-seeds	—	2·1	1·8		
Iron and steel	— [2]	1·9	1·2		
Manufactures	—	*47·0*	*46·2*		
Chemicals	4·4	5·8	8·0		
Elec. machy. and materials	6·2	12·5	3·6		
Machinery (other)		16·1	5·8		
Road vehicles and parts	3·6	6·0	5·0		
Paper, and manufrs. of	—	2·1	3·4		
Iron and steel	4·4	2·3	1·9		
Rubber (raw and manufd.)	—	2·5	1·8		
Total value in 1,000 million pesetas	*3·06*	*2·58*	*0·95*		
Countries:					
United States		17·6	16·8		
Germany		9·8	11·9		
United Kingdom		11·4	10·4		
France		13·8	7·5		
India		4·5	3·3		
Argentina		4·8	3·2		
Italy		3·7	3·1		
Belgium		2·6	3·1		
Sweden		2·7	3·0		
Netherlands		2·2	2·9		
Egypt		1·1	2·6		
Switzerland		1·8	2·0		
U.S.S.R.		1·8	2·0		
Philippines		2·5	1·8		

[1] Cereals, excluding wheat. [2] Included in manufactured iron and steel.

Par rate of exchange 25·225 pesetas = £1.

The chief seaport of Spain in most periods of history has been one having for its hinterland the basin of the Ebro, in that part of the country which contains the most vigorous and energetic part of

SPAIN

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Foodstuffs	—	*56·4*	*66·1*		
Oranges	9·6	12·2	21·2		
Other fresh fruit		2·0	3·8		
Olive oil	7·9	8·9	8·6		
Wines	11·7	12·5	7·8		
Dried fruits: olives	7·1	2·2	1·6		
almonds		3·4	5·2		
others		2·2	2·9		
Fresh vegetables	4·2	2·8	4·7		
Preserved fish	—	3·4	3·6		
Cereals	3·3	2·2	1·2		
Raw materials	—	*19·8*	*16·3*		
Hides, skins, and leather	3·3	2·7	2·7		
Iron pyrites	7·7	1·4	2·7		
Iron ore		2·8	2·1		
Lead (raw)	3·1	4·6	2·5		
Copper (raw)	4·8	1·9	0·7		
Manufactures	—	*21·3*	*16·4*		
Chemcls., dyes, drugs, &c.	—	4·6	4·8		
Cork manufactures	2·9	6·9	3·5		
Cotton fabrics	3·4	3·3	2·6		
Wood, and manufrs. of	—	1·9	1·6		
Total value in 1,000 million pesetas	*1·59*	*2·00*	*0·71*		
Countries:					
United Kingdom		20·6	23·6		
France		20·8	17·1		
Germany		7·3	10·1		
United States		11·1	8·1		
Argentina		5·6	4·8		
Netherlands		4·4	4·7		
Belgium		3·8	4·6		
Italy		5·5	4·5		
Cuba		3·5	2·1		

the population; but, owing to the physical conditions already mentioned at the mouth of that river, it has never lain either on the Ebro or its delta. In Roman times the main outlet and inlet of this hinterland was Tarragona, or *Tarraco*, as it was then called, originally a Massilian foundation; but this city was destroyed

first by Goths and afterwards by Arabs, and, its harbour having been allowed to be silted up, the port fell into decay. Barcelona, another ancient city, with comparatively easy access to the Ebro valley by way of Lerida, then came to the front, and during the Middle Ages, from about the eleventh century, was one of the chief seaports of the Mediterranean, specially celebrated in the history of commerce for its code of commercial law (*Consulado del mar*) of 1229, and for the Catalan map of 1375. The discovery of the New World gave for a time greater importance to the Spanish ports on the Atlantic, above all, in the end, to Seville, which in 1501 was made the sole seaport for transatlantic trade. Twelve galleons proceeded thence annually to Portobello, on the isthmus of Panama, and after 1547, fifteen to Vera Cruz to bring back thence the treasures of the New World. The Crown of Spain claimed for itself one-fifth of the precious metals produced by the mines of the 'New Indies,' and these royal treasures were stored in Seville in the Torre del Oro, or 'tower of gold.' The export from Spain even of the gold and silver belonging to private merchants was forbidden, a policy which is recognised by economists from the seventeenth to the twentieth century as having been the ruin of Spanish industry. Causing prices to rise higher in Spain than elsewhere, it rendered the people of Spain unable to manufacture so cheaply as the inhabitants of other countries. Madrid owes its importance solely to its being the political capital of Spain and to its central position. Valladolid is the chief centre of trade for the northern half of the Spanish tableland.

TOWNS OF SPAIN, 1934

Madrid	1,048,000	Bilbao	176,000
Barcelona	1,148,000	Murcia	166,000
Valencia	353,000	Granada	125,000
Seville	239,000	Cordoba	118,000
Malaga	204,000	Valladolid	98,000
Saragossa	189,000	Cartagena	97,000

PORTUGAL. The chief Portuguese seaports on the west coast are Oporto, Lisbon, and Setubal; on the south coast, Faro and Olhao. A new harbour for Oporto has been constructed at Leixoes, three miles north of the mouth of the Douro, and is available to large ocean-going steamers. The estuary of the Tagus forms an admirable natural harbour, and Lisbon is directly accessible for large ocean liners.

TOWNS OF PORTUGAL, 1930

Lisbon	594,000	Oporto	232,000

PORTUGAL[1]

SPECIAL IMPORTS,[2] EXCLUDING[3] BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29	Percentages of Total Value. '71–75	'91–95	'01–05	'11–13	'25–29
1. Iron & steel manufactures	—	—	1·01	1·36	—	—	—	7·6	7·9	—
2. Raw cotton	0·12	0·49	0·91	1·20	1·44	1·7	5·9	6·9	7·3	6·2
3. Coal	0·28	0·42	0·95	1·10	1·30	4·0	5·1	7·1	6·4	5·6
4. Wheat	0·35	1·01	0·69	0·83	2·08	5·0	12·2	5·2	4·8	9·0
5. Cod	0·32	0·40	0·75	0·93	1·43	4·0	4·9	5·7	5·4	6·2
6. Cottons	0·80	0·44	0·62	0·85	1·02[5]	11·4	5·3	4·7	4·9	4·4
7. Sugar	0·43	0·43	0·53	0·64	0·97	6·1	5·2	4·0	3·7	4·2
8. Machinery & locomotives	—	—	0·38	0·77	1·51	—	—	2·8	4·5	0·5
9. Cattle and pigs	0·21	0·19	0·40	0·33[4]	—	3·0	2·3	3·0	1·8[4]	—
10. Rice	—	0·15	0·31	0·36	0·67	—	1·9	2·3	2·1	2·9
11. Raw hides	0·18	0·16	0·28	0·32	0·64[6]	2·6	1·9	2·1	1·8	2·8
12. Raw wool	0·14	0·26	0·32	0·33	0·19	2·0	3·1	2·4	1·9	0·1
13. Wool manufactures	0·40	0·25	0·20	0·20	0·57[7]	5·7	3·0	2·0	1·2	2·3
Average total value	0·96	8·39	13·27	17·30	23·19					

Principal Countries.	Percentages. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. United Kingdom	32·9	28·6	29·7	23·2	27·3	27·4
2. Germany	2·1	11·0	16·3	16·0	16·9	11·5
3. United States	1·7	10·0	8·7	10·0	10·2	11·9
4. France	13·2	11·1	9·8	9·7	8·4	10·0
5. Spain	8·3	7·5	9·1	7·0	5·7	4·0
6. Argentina	—	0·2	1·7	3·9	3·2	3·8
7. Belgium	0·4	3·1	4·1	3·7	5·5	7·2
8. Portuguese Poss.	2·1	2·7	2·8	3·2	3·1	7·2
9. Norway, Sweden	2·0	3·2	2·4	3·0	3·4	3·4
10. Brazil	9·2	5·9	4·1	2·3	2·1	1·9

SPECIAL EXPORTS,[2] EXCLUDING[3] BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '71–75	'91–95	'01–05	'11–13	'25–29	Percentages of Total Value. '71–75	'91–95	'01–05	'11–13	'25–29
1. Wine	2·12	2·56	2·26	2·71	2·65	40·0	47·2	34·1	35·0	32·8
2. Cork	0·23	0·68	0·77	0·82	1·12	4·5	12·6	11·6	10·6	13·9
3. Animals, excluding horses	0·38	0·22	0·54	0·52	0·02[8]	7·4	4·0	8·2	6·7	0·2
4. Sardines	0·03	0·24	0·36	0·64	1·25	0·6	4·4	5·4	8·3	15·5
5. Cotton manufactures	—	0·11	0·30	0·19	0·31	—	2·1	4·5	2·5	1·9
6. Horses, mules, asses	0·01	0·06	0·32	0·20[4]	—	0·2	1·1	4·9	3·1[4]	—
7. Copper ore	0·35	0·33	0·25	0·23	0·11[9]	6·7	0·5	3·8	3·0	1·4
8. Olive oil	0·10	0·05	0·12	0·13	0·14	3·0	1·0	1·8	1·7	1·7
9. Fruits	0·25	0·11	0·13	0·15	0·36	4·7	2·1	1·9	1·9	4·5
10. Fish, excluding sardines	—	0·06	0·09	0·08[4]	0·30	—	1·0	1·4	1·0[4]	3·7
11. Hides and skins	—	0·04	0·05	0·06	0·05	—	0·7	0·8	0·8	0·6
12. Potatoes	—	0·04	0·06	0·04[4]	—	—	0·7	0·9	0·5[4]	—
13. Raw wool	0·08	0·04	0·04	0·03[4]	0·10	1·5	0·7	0·6	0·4	1·2
Average total value	5·21	5·41	6·62	7·74	8·08					

Principal Countries.	Percentages. '71–75	'91–95	'01–05	'06–10	'11–13	'25–29
1. United Kingdom	35·0	30·5	26·5	21·1	20·8	26·6
2. Brazil	16·1	27·1	17·6	17·6	18·3	7·2
3. Spain	6·8	7·8	16·7	16·7	15·6	3·8
4. Germany	2·9	8·9	7·5	8·2	9·3	9·4
5. Angola	—	1·8	7·3	8·0	5·9[4]	11·7[10]
6. Mozambique	—	1·1	3·7	3·3	3·1[4]	
7. Belgium	0·9	2·8	2·7	3·2	3·1	1·7
8. St. Thomas and Prince's Is.	—	1·3	2·9	3·1	3·1[4]	—
9. Russia	2·0	2·3	2·8	2·6	2·5	—
10. France	4·4	3·9	2·7	2·6	1·1	10·6
11. United States	1·2	3·0	2·1	2·3	3·0	5·5
12. Italy	0·9	0·7	1·1	1·6	1·7	3·1

[1] Including Azores and Madeira. [2] 'Declared values.' [3] Bullion and specie are included before 1885. [4] Average on 1911 and 1912 only.
[5] Cotton yarn. [6] Hides, skins, and leather. [7] Yarn. [8] Live animals. [9] 'Ores.' [10] Portuguese Possessions.

PORTUGAL

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*30·4*	*19·8*		
Codfish	8·1	5·9	5·8		
Sugar	6·9	3·8	3·6		
Rice	3·9	2·8	1·6		
Maize	—	1·8	1·6		
Wheat	4·3	8·4	1·5		
Raw materials	—	*33·4*	*36·9*		
Iron (raw)	7·1	4·6	6·4		
Coal and coke	6·3	5·8	6·6		
Cotton (raw)	10·8	5·9	6·6		
Mineral oils	2·2	3·0	3·4		
Oil-seeds	1·4	1·8	2·3		
Hides, skins, and leather	1·9	2·7	1·6		
Manufactures	—	*36·1*	*33·7*		
Machy., apparatus, tools	6·8	7·1	8·5		
Chemicals	2·4	2·8	4·5		
Iron and metals	3·2	2·9	3·5		
Ships and other vehicles	0·6	1·9	4·0		
Cars	1·1	3·4	3·0		
Cotton yarns	4·8 [1]	4·1	2·6		
Woollen yarns	2·2 [1]	2·3	0·7		
Other yarns	—	3·8	3·4		
Total value in 1,000 million escudos	*2·96*	*2·52*	*1·92*		
Countries:					
United Kingdom	33·1	25·9	25·0		
Germany	15·7	14·7	13·6		
United States	10·2	12·8	11·0		
Portuguese Possessions	6·6	7·4	10·2		
Belgium	8·1	7·5	7·7		
France	3·7	9·9	5·8		
Netherlands	2·9	4·3	3·6		
Spain	3·5	4·2	3·5		
Italy	1·6	2·1	2·4		
Norway	4·0	3·0	2·2		
Brazil	4·0	1·8	2·1		
Argentina	3·1	2·8	1·1		

[1] Includes tissues and manufactures, too.

Par rate of exchange, 110 escudos = £1 (approximately correct, 1926–35).

PORTUGAL

SPECIAL EXPORTS

—	Percentages of Total Value.		
	1921.	1926–30.	1931–35.
Foodstuffs	—	*61·6*	*61·3*
Wine : port	23·9	22·9	19·6
red, common	3·2	4·4	2·9
other	6·4	4·3	2·9
Sardines (tinned)	21·1	15·2	17·2
Other fish (tinned)	—	2·8	1·3
Fruit (fresh and dried)	1·4	2·5	2·6
Olive oil	0·8	1·9	2·3
Raw materials	—	*26·5*	*24·0*
Cork	6·9	11·8	9·8
Coal	4·8	5·2	3·2
Manufactures	—	*11·6*	*14·1*
Cotton manufacturers	4·6	3·7	5·0
Cork stoppers	1·2	1·9	2·9
Total value in 1,000 million escudos	*0·95*	*0·93*	*1·08*
Countries :			
United Kingdom	26·9	25·0	23·6
Germany	8·8	14·7	12·7
France	7·7	11·3	12·6
Portuguese Possessions	13·8	13·5	12·0
United States	4·4	5·7	5·7
Belgium	7·3	4·8	5·5
Brazil	6·4	7·3	4·6
Spain	2·6	3·6	4·5
Italy	3·9	3·0	2·6
Netherlands	2·9	2·9	2·3
Norway	2·9	2·4	1·3

GIBRALTAR

Gibraltar, a fortress on a commanding rock at the east of the strait of that name (at this place nearly 13 miles, at its narrowest about 8 miles wide), has been in the hands of the British since 1704. Commercially, Gibraltar is important as a free port and coaling station, and it has docking accommodation for the largest vessels in the British Navy. Large cold stores have been erected.

ITALY[1]

The area of Italy is only slightly less than that of the British Isles, but the population about one-seventh smaller. The density of the population is thus less on the whole, but is nearly everywhere high. Enclosed on the north and north-west by the Alps, and washed almost everywhere else by the sea, the country has well-defined natural boundaries. The hindrance to communication presented by the Alps and the nature of the communications now established across and through this barrier have already been considered (see p. 401); in addition, there is the new railway across the Maritime Alps connecting Cuneo and Nice, which involved the piercing of two long tunnels. The work was delayed by the War. Many passes across the Apennines, which are continuous with the Alps in the north-west, and stretch through the entire peninsula, have facilitated the construction of railways, and several lines connect the principal railways on opposite sides of the peninsula.[2] These last, it will be seen, keep for the most part close to the coastline, that on the east being continued along the south coast to Reggio, on the Strait of Messina. On the eastern side the railway, running northwards, forks at Rimini, and one main line proceeds northwestwards, with remarkable directness, till it crosses the Po at the old bridge-town of Piacenza; passing through a number of old towns of more or less note, Forli, Faenza, Imola, Bologna, Modena, Reggio, each lying at the outlet of a valley of the Apennines. This railway-line marks pretty well the boundary between the foothills of these mountains and the great plain which stretches between them and the Alps. The other main line still keeps near the coast as far as Ravenna, and then sweeps round the low and marshy region extending from the delta of the Po to the mouth of the Reno, crosses the Po near Ferrara, and passes through Padua to Venice. The marshy region just referred to includes the lagoons called the Valli di Comacchio, which are of importance for their production of bay-salt and their eel-culture.

The navigable rivers of Italy are now of very little importance in this regard. The Po is navigable for boats to Turin, for steamers to Valenza, seven miles below the confluence of the Sesia; the Ticino is navigable from its issue from Lake Maggiore; the Adda from its issue from Lake Como, the Adige from a little below

[1] For help in the revision of this section I am greatly indebted to Professor Umberto Toschi of the University of Bologna.

[2] The most important line is actually that from Milan to Rome *via* Bologna and Florence, made shorter in 1935 by tunnels between Bologna and Prato and known as the 'Direttissima.'

Bolzano in the Tirol, the Bacchiglione from Vicenza, the Brenta from Padua. In the peninsular portion of the country the only navigable rivers are the Arno and the Tiber, the former being navigable by boats to Florence, the latter by steamers to Rome, and by smaller boats sixty miles higher up.

The climate of Italy has the characteristics of that of the Mediterranean in general, but if we make a comparison with Spain and Portugal, it is important to observe that Italy lies farther north than the Iberian Peninsula, that the Italian Peninsula is narrower, and that the surface is more irregularly mountainous. Whereas nearly half of the Iberian Peninsula lies to the south of 40° N., in Italy the only parts to the south of that line are the southern half of the Island of Sardinia, the whole of Sicily, and portions of the smaller peninsulas of the mainland. These southern portions of Italy have a climate like that of southern Spain, and in particular are distinguished by the same degree of drought in the summer months. The greater part of Italy, however, is blessed with a much greater rainfall than Spain, for whereas in Spain the edges of the tableland serve to cut off rain to a large extent from the interior, the mountains of Italy promote the rainfall, especially since they descend to the sea on both sides. Even the plain on the north of the Apennines is not deprived of rain through the intervention of these mountains, since the rain-bearing winds are forced to ascend still higher by the loftier ranges of the Alps. The glaciers of these mountains likewise help to maintain the volume of the innumerable streams which descend from them, and thus increase the supply of water for irrigation, which has been carried out on a more extensive scale in Italy than anywhere else in Europe. The irrigated area in the Po basin is about equal in size to the counties of Lincoln and Norfolk combined. One of the largest of the Italian irrigation canals is the Cavour Canal in Piedmont. In May 1924 a large lake was formed by a dam on the Tirso to irrigate more than 80 square miles in southern Sardinia and to develop water-power.

Extensive tracts of the lowlands of Italy suffered greatly from malaria—the Tuscan Maremme, the Roman Campagna, the Pontine Marshes in southern Latium, the shores on the west side of the Gulf of Taranto, and the Sardinian plains having been the most severely stricken areas. Considerable ameliorations have, however, been carried out by means of drainage and other works, and the discovery of the connection between mosquitoes and the propagation of malarial fever has led to further steps being taken for the preservation of health in the infected districts. The plains round Verona have been reclaimed, and by means of a huge pipe under the Panaro (completed in 1899) the whole area between the embankments of the Po, the Secchia, and the Panaro (including the marshes below Ferrara) is now drained into the Adriatic. In 1935 the area under reclamation schemes was over 20,000,000 acres. Great

advances have been made under the Fascist regime, notably near Rome, where the Pontine marshes were reclaimed between 1930 and 1936 and four thousand farms established for veterans of the Great War; three new towns have been founded, one of them being made the centre of the new province of Littoria.

Altogether, the climate and soil of Italy are sufficiently good to allow of the existence of a large population directly dependent upon agriculture. The area occupied by corn-crops is about twice as great as in the United Kingdom, over and above the area under vineyards, olive-yards, fruit-trees, sugar-beet (increasingly cultivated since 1890), flax (cultivated almost solely for the seed), and hemp (especially in Emilia, Campania, and Venetia), pasture-grasses, &c. The principal corn-crop is wheat. It covers from six to eight times as great an area as in the United Kingdom, but the only Italian wheat that is noted for its quality is that of Apulia, in the south-east, where there is grown a hard wheat well adapted for making maccaroni. Maize, the second Italian corn-crop in extent of acreage, furnishes an important food of the people throughout a large part of the country. In northern and central Italy great advances in agriculture have been made by the introduction of the rotation of crops and of chemical manures, and by the spread of agricultural education.

The Italian production of raw silk (reputed the best in the world), rice, wine, olives, oranges, and figs is referred to elsewhere; but here it may be added that oranges and other citrus fruits and their derivatives are so important in Sicily as to make up more than two-fifths of the value of the exports from that island,[1] that rice is the most valuable crop of the irrigated fields in the north, and that the production of wine is widely distributed in Italy, especially in Piedmont, Campania, extending most rapidly in the southern parts of the country, and Sicily. Most Italian wines are ill-prepared, so that they deteriorate instead of improving with age. Among those in best repute are Marsala, grown in the west of Sicily; Chianti, grown in the valleys of Tuscany to the south of Florence; and Asti, grown on the southern slopes of the Piedmontese hills to the west of Alessandria.

The grass and forage crops of Italy are very important in the irrigated plains. The meadows are regularly mown four times a year, and in some peculiarly favoured districts as many as nine crops have been known to be reaped in a single year from the same field. The richness of these meadows led to a considerable trade both export and import, calves being largely imported from the Tirol and Switzerland and, formerly at least, returned or exported to France as fat cattle. But besides this export of cattle there is a large import of milk-cattle from Switzerland, these imported animals

[1] The growing of fruit and vegetables for export is increasing greatly in importance.

yielding a larger quantity of milk than the native breeds. When fed on irrigated meadows for ten months in the year Swiss cows produce 700 gallons of milk, as against about 500 gallons produced by the native cows. This large produce of milk gives rise also to a large trade in cheese. The famous Parmesan, Gorgonzola, and Stracchino cheese are all made in the plains of Lombardy and northern Emilia. The rearing of poultry is likewise characteristic of the agriculture of northern Italy, and to this cause we owe the large export of not only eggs but also fowls, for poultry form the next item in value to cattle under the head of animals exported. Italian eggs even reach England. Apulia, besides being noted for its wheat, is noted for its wool. The sheep of the province are migratory like those of the Spanish tableland, wide tracts being reserved for their migration along the regular routes. Sheep are, however, more important in Latium and Sardinia.

The Sicilian sulphur, produced chiefly in the neighbourhood of Caltanissetta, Girgenti, and Catania, is the most important mineral product of the kingdom. It is next in importance to citrus fruits among the exports of the island. Iron ore of excellent quality is obtained in the island of Elba. Ores of the same metal are worked in the Val d' Aosta, the Val Trompia (between the lakes Iseo and Garda), and in the island of Sardinia. Sulphuric acid is made from pyrites. Lead and zinc are important products of this island (the south-west round Iglesias). Tuscany produces among the Apuan Hills in the north the celebrated statuary marble of Massa and Carrara. Bauxite in Istria and Abruzzes allows a considerable production of aluminium.

In a volcanic district in the south of Tuscany boracic acid escapes from the ground in the form of vapour, and the acid is concentrated in water and then obtained by evaporation. The chief centre of this industry is Larderello (23 miles west by south of Siena), where the vapours have been used to heat engine boilers since 1897, and since 1912 to develop electric energy, which is transmitted to, among other places, the iron and steel works of Piombino, and the copper pyrites mines of Massa. Mineral fuel exists in very limited amount, chiefly in the form of petroleum, of which there are wells in the Emilian Apennines (chiefly in the province of Piacenza), and lignite, the chief centres of production of which are Castelnuovo (prov. Arezzo) and Spoleto (Umbria). Limited quantities of anthracite occur in the Val d' Aosta and a mesozoic coal (' liburnian ' coal) in Istria. The scarcity of coal and oil has been a spur to the development of hydro-electric power, especially from the Alps. Over five million horse-power has been utilised.

Italian manufactures have developed in recent years with remarkable rapidity, even before the extensive use of hydro-electric power and in spite of the dearness of coal. Before the War 90 per

cent. of Italy's import of coal came from England, and there is accordingly a good deal of significance in the following comparison of the average pit-mouth prices of coal per ton in the United Kingdom and import prices in Italy (at 25 lire to the £). The year 1896 was the year of minimum, 1900 that of maximum, prices in the United Kingdom in the period 1889–1901. In spite of the high price in 1900, the quantity of coal imported in that year (nearly 5,000,000 tons) was greater than ever before.

	1896.		1899.		1900.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
United Kingdom	5	10¼	7	7	10	9¾
Italy . .	16	9½	24	9½	33	6

Only about 50 per cent. of Italy's import is now supplied by England ; the bulk of the remainder comes from Germany and Poland. Her total import is now from 10,000,000 to 14,000,000 tons a year. The chief local advantages to set against the disadvantage of scarcity of fuel are the density of population furnishing abundance of labour and a large local market, the abundance of water-power, and in some cases, more particularly in that of the chief textile industry (silk), the abundance of raw material. Italian labour is not only abundant, but for certain kinds of work apparently the cheapest in Europe in proportion to efficiency. It was the cheapness of Italian labour and the unsatisfactory conditions at home, of which that cheapness is the sign, that led to such a large annual emigration (averaging 670,000 in 1901–13, 396,000 in 1923, and 280,000 in 1930). Formerly there was a large temporary emigration of labourers in bodies under contract, but the emigration law of 1901, which suppressed emigration agents, altered this.

The water-power capable of being utilised in Italy is estimated at nearly 9,000,000 horse-power, and with the aid of electricity this is being steadily made more available. In 1900 about 300,000 horse-power was estimated as being already effectively utilised ; on June 30, 1911, the amount of horse-power conceded was 956,000, of which more than a third was in Lombardy. At the industrial census held on June 10 in the same year, the total amount of power employed in Italian industries was returned at 1,574,000, of which water-power thus made up about 60 per cent. In 1930 the hydro-electric power utilised was roughly 4·8 million horse-power. At Piano d'Orta, on the Pescara, the power derived from that river is utilised in a very large installation in the manufacture of carbide of calcium in the first works erected for the production of nitrolim. Recently large sections of the railways have been electrified.

The manufacture of silk yarn by the operations of throwing and twisting is the chief Italian manufacturing industry connected with silk, an industry making use not merely of the valuable raw material

produced at home but also of large supplies from abroad. The weaving of silk by power-looms later rapidly developed, chiefly at the expense of the French industry. The centres of this industry are Como, Milan, and Bergamo. By 1930 there were 774 mills and 25,000 looms. Italy then paid attention to artificial silk also, and by 1935 the output reached 68,000 tons—fifteen times the home production of silk. Cotton manufactures have grown with almost equal rapidity, and likewise take a high place among the exports. The spinning branch of the industry is producing yarns of increasing fineness. Woollen manufactures are of considerable importance for home consumption. If one place may be singled out from others in which the woollen industry is concentrated, it is the small town of Biella, in an Alpine valley in Piedmont, where the industry, having first been fostered by the abundance of raw material, had attained a position of importance by the middle of the fourteenth century. Cotton, linen, iron, earthenware, and leather manufactures have since grown up at the same place. Schio and Pordenone, near the base of the Alps in Venetia, are among the places in which textile factories have been established in the east, and the former has the advantage not only of water-power but of a supply of lignite in the vicinity (at Valdagno). The rayon industry is very important (*cf.* p. 231).

The iron industry has been specially encouraged in recent years by the Italian government with the view of making itself independent of foreign countries. Forty years ago the only important blast furnaces in Italy were those of Follonica, Cecina, and Piombino for smelting the ores of Elba, but in 1899 a company was formed to start large blast furnaces on Elba itself (at Portoferraio). A specialty of the Italian iron industry is the refusion of old iron, which is imported for the purpose from all parts of the world. This industry is carried on chiefly on the Ligurian coast not far from Genoa. Large steel works have been established at Terni, where advantage is taken of the enormous water-power furnished by the falls on the Nera, a left-bank tributary of the Tiber, and where there is the further advantage of a supply of lignite at Spoleto, a few miles distant. Other important steel-works are carried on at Milan and Savona. There has been a marked post-War expansion.

A considerable amount of iron and steel shipbuilding is carried on not only in the government arsenals at Spezia, Venice, Castellammare, and Taranto, but also by private firms under a system of bounties begun in 1885. One of the most remarkable developments of recent years has been the making of motor-cars and motor-car bodies, an industry largely carried on in Turin and other northern towns, where a great deal of water-power is employed in the industry.

As might be expected in an agricultural country, the making of fertilizers is important on the one hand and the preserving and

packing of agricultural products on the other. The new sugar beet industry (Venetia, Emilia, Campania) has already rendered Italy independent of foreign supplies.

Other characteristic manufacturing industries of Italy are mainly those of an artistic or semi-artistic nature. The declining glass-works and the lace industry of Murano, north of Venice, have long been noted. Florence produces fine earthenware and mosaics; many Italian towns are famed for their sculptures in marble and alabaster and their artistic woodwork. Milan is the chief seat of Italian cutlery. Tuscany is well known for its straw-plaiting. The growth of Italian leather industries has led to an increasing import of hides from India.

The leading features of Italian commerce are exhibited in the tables given below, but it may be noted as one of the striking peculiarities of the foreign commerce of this country, that the chief articles of export are sent abroad by land, notwithstanding that the country has such a large extent of seaboard and many good ports. The reason of this is obvious. The products of the northern provinces, silk, rayon, wine, oil, eggs, cheese, straw-plaiting, and even the products of the motor-car industry, &c., are not merely sent more cheaply to their principal destinations by an all-rail route than by one which involves a transhipment at two seaports, but all these commodities are of fairly high value in proportion to their bulk, and accordingly such as suffer a relatively small increase of cost in railway transport. The circumstance here referred to is prejudicial to some extent to Italian shipping, inasmuch as it causes the imports at the principal seaports of the mainland greatly to exceed the exports, and hence makes it difficult for vessels both to land and ship a cargo at the same port. Of the imports from Italy into the United Kingdom in 1912 only 52 per cent. came direct, about 30 per cent. through Belgium, and 18 per cent. through France. This still applies to the large import of silk and rayon goods, to raw silk and cheese, but less to the leading import into Britain from Italy—the lemons of Sicily, which naturally come mainly by sea.

Besides Rome, the capital, the chief inland towns are Milan, Turin, and Florence. Rome owes its pre-eminence more perhaps to historical than to geographical circumstances; but its situation is not without geographical advantages, some of which must have been of more importance in early times. It lies about midway between the extremes of the kingdom, on the chief river of the peninsula. Its port is Civitavecchia, but Naples is largely used Since 1905 Rome has been the seat of the International Agricultural Institute. Its aim is to collect, arrange, and publish as quickly as possible all kinds of statistical and other information concerning agriculture, with a view to steadying the trade and promoting the production of agricultural commodities in all parts of the

world. Monthly bulletins in Italian, English, and French began to be issued by it in January 1910.

Milan (Ital. *Milano*), the former capital of Lombardy, became at a very early date a great seat of trade, chiefly in consequence of its central position in one of the most fertile parts of the northern plain. The Alpine passes approached by the roads along the banks of Lakes Maggiore and Como confer additional importance on it, and this importance was further enhanced by the St. Gotthard and Simplon railways. It is the centre of the trade in silk and wheat—a great seat of silk and other industries. Turin (Ital. *Torino*), the former capital of the kingdom of Sardinia, for a short time of the kingdom of Italy, is situated on the Po, where it passes round the base of a bastion of the Apennines, and just in face of the valley of the Dora Riparia, which leads up to two of the most frequented Alpine passes of the Middle Ages, the Monginevra and Mont Cenis passes. It is the valley now traversed by the Mont Cenis railway on the eastern side of the Alps. Florence (Ital. *Firenze*), the chief town in Tuscany, lies at the head of the most considerable and fertile plain of that province, closely begirt by hills. It occupies a position of peculiar importance as a meeting-place of trade-routes. The greater portion of northern Italy, including all that part on which the Alpine passes from the Simplon to the Brenner descend, communicates most easily with all southern Italy by the route passing through Bologna and Florence. In the Middle Ages this route led due south across La Futa pass (under 3,000 feet). Now the main railway passes up the valley of the Savena, then south by way of Prato, and on that railway trains are to be seen containing trucks that have passed through both the St. Gotthard and the Brenner tunnels. Moreover, from its situation at the head of the fertile plain of the Arno it brings all that plain into connection with places beyond the mountains in different directions. The commercial advantages arising from this situation at an early date developed manufactures for which the sheep pastures of the Maremme (on the coast of Tuscany) supplied raw material. The wealth thus created led to the development of banking, which had risen to considerable importance in the city as far back as the thirteenth century.

Susa stands at the fork of the passes leading from the upper part of the valley of the Dora Riparia west of Turin, the Monginevra pass leading thence south-westwards to the mouth of the Rhone valley, the Mont Cenis north-west up the Rhone valley. In the Middle Ages two other passes were of importance in relation to Turin, those, namely, branching off at Aosta at the upper end of the valley of the Dora Baltea, the little St. Bernard leading westwards to the Isère and thus to the Rhone valley, the Great St. Bernard to the Rhone valley in the Swiss canton of Valais above

the Lake of Geneva. Trento (Trent) and Bolzano (Bozen) are the two principal towns in the recently ceded territory of the Trentino, somewhat similarly situated to Susa and Aosta, Trento Italian-speaking, Bolzano mainly German. Trento stands at the point where an easy road eastwards leads to the Val Sugana, the upper part of the valley of the Brenta, by which the Brenner route in past times was brought into communication with Venice, an interesting memorial of which is found at Trento in the palace of the Fuggers, the great Augsburg merchant family of the sixteenth century. A railway now follows the same route, but one quite inadequate for any considerable traffic, which prefers the Verona-Padua route.

The principal Italian seaports now, as they were in the Middle Ages, are Venice and Genoa. Venice (Ital. *Venezia*), the chief port, not only for the eastern part of the northern plain but also for the traffic of the Brenner railway, stands, as is well known, on numerous islets in a lagoon guarded by a line of low sand islands. Through this barrier there are two channels, the Lido in the north and the Malamocco in the south, which have been made deep enough for the largest vessels. Venice is one of the few places belonging to the Mediterranean basin at which there is a sensible tide ; and since the construction of the long piers at the Malamocco Channel the scouring action of the tide has been so much increased that the channel has been deepened from about 16 to 30 feet, and the adjoining part of the lagoon has likewise steadily increased in depth. Chioggia is the port at the south end of the lagoon to which Venice belongs.

Trieste, at the head of the Adriatic, was annexed to Italy at the close of the War, and still serves as a seaport for a large part of central Europe, as it did under Austrian rule. Direct trains run from Vienna, Praha (Prague), and Budapest to Trieste. In the early Middle Ages it was subject to Venice, and to escape from that domination it voluntarily submitted to Austria (under the Babenburgs) in 1382. Its most prosperous period began about 1719, when it was made a free port. In 1832 it became the seat of the Austrian Lloyd, which was at first like the English Lloyd's, merely a shipping registration company, but in 1836 was reorganised as a shipping company. Pola, on the west coast of Istria, formerly an Austrian naval station, has been turned into a commercial port. Fiume, though annexed to Italy, no longer serves as a major rival to Trieste as an outlet for central Europe. Its neighbour, Susak, on Yugoslavian soil, has grown up to take much of that function. By the Treaty of Rapallo, which was ratified by the Italian government in December 1920, Fiume was accorded a position similar to that of Danzig, but this position was persistently contested till in 1924 the city was eventually handed over to Italy. As a port it was a Hungarian creation, though only the minority of its population is Magyar, the bulk of the inhabitants being either Italians or Slavs.

Genoa (Ital. *Genova*, pronounced, however, *jen'oa*) has the advantage of a fine natural harbour, but the growing commerce has necessitated improvements and enlargements. It is easily the chief port of Italy connected by rail and road with a rich hinterland which includes southern Switzerland. Spezia, the chief Italian naval station, has the disadvantage of difficult communication with the interior. For centuries Leghorn (Ital. *Livorno*, pronounced *li-wor-naw'*) has been the chief seaport of the valley of the Arno and the whole of Tuscany. Naples (Ital. *Napoli*), formerly the largest town in Italy, has a deep and spacious harbour enclosed by moles. The abundance of the local labour supply led to the establishment at Naples of various manufacturing industries, including textiles, for which there was apparently little natural advantage. Fiumicino, founded in 1825, a little to the north of the mouth of the Tiber, is one of the ports of Rome, but does not rival the older but more distant port of Civitavecchia (' Old Town '). The port of Civitavecchia is an artificial creation. A new port has been established at the mouth of the Tiber near Ostia.

Palermo, the chief Sicilian port, has not so good a harbour naturally as its ancient predecessor *Panormus*, the modern town, in consequence of a rise of the coast, covering part of the site of the ancient harbour. Most of the Sicilian ports export large quantities of oranges and other fruit. Palermo is also the chief place of export of Sicilian sumach and manna. Messina exports large quantities of wine-lees ; Marsala is the chief place of export of wine ; Girgenti, Licata, and Catania are the chief ports for sulphur.

Geographical influences in the Middle Ages. The high value of the commerce of Venice and Genoa in the past was in a large measure due to the enormous profits earned by those who were successful in the trade in the relatively high-priced commodities derived from the East, above all, pepper and spices. Venice and Genoa were so situated as to serve as the principal intermediaries in that commerce for a larger proportion of the population of the plains of northern Italy than any other ports. For Venice, the immediate hinterland was (and is) the eastern part of those plains ; for Genoa it was (and is) the western part of those plains. Both, however, had an important extension of those hinterlands beyond the Alps. In the case of Venice the trans-Alpine markets were mainly reached by either the Brenner or the Reschenscheideck. The Brenner route, including the section below Innsbruck emerging on the high plain of Bavaria to the north of Ratisbon, gave the most direct access to southern Germany and all the territories reached by the rivers of the Elbe basin, and thus brought the Baltic generally into communication with the east by way of Lübeck. Both the Brenner and the Reschenscheideck brought Venice into connection with the Rhine valley, and so with the ports of the North Sea, but in both cases a second pass had to be crossed before Augsburg was reached.

The trans-Alpine markets of Genoa were reached mainly by Milan, and above all by the pass-routes (of which there are several) descending the Rhine valley from Coire to the head of the Lake of Constance. All these routes brought Milan into connection both with the Rhine and Elbe basins through Ulm ; with that of the Elbe also through Augsburg. In the later Middle Ages the more direct north route across the St. Gotthard was also frequented, and for the north-west the Simplon route was also important. Other trans-Alpine markets were reached by the way of the passes converging on Turin, but for these markets Genoa had a rival both in Savona and the ports at the mouth of the Rhone valley (Marseilles and Narbonne). From the early part of the fourteenth century a large part of the trade of Venice and Genoa with the Low Countries and through them with other North Sea and with Baltic ports was carried on by sea—by the so-called 'Flanders galleys.'

Venice owed its origin and early rise solely to the fact that during the first period of its history an easily defended situation was a matter of first consequence. The islands in the lagoon in which it stands were settled in 452 by refugees from the port of Aquileia at the time of its destruction by the Huns. Aquileia, now an inland village, with a harbour long ago silted up, then had much the same importance as a port of the Roman Empire that Venice had in later times as an independent republic. The refugees of 452 were reinforced by others fleeing before the Lombard invaders of 568. The islands on which that city now stands were settled in 810, and shortly after that date Venetian ships were known in the eastern waters of the Mediterranean. Its commerce increased rapidly after the Venetians (about 990) conquered the coasts of Istria and Dalmatia and put down the pirates by whom those coasts were infested. In later times Venice had numerous factories in the Levant and territorial possessions were acquired there both by the state and Venetian families. The trade both of this city and of Genoa was greatly extended by the Crusades. The fourth crusade, in particular, which was diverted by the Venetians from its main purpose and resulted in the capture of Constantinople in 1204, was the principal cause of the acquisition of territory by both Venice and Venetians. Crete was in the possession of Venice from 1206 to 1669. Not till 1338 was any territory acquired by Venice on the mainland of Italy. For a long time Chioggia was a rival of Venice, and no doubt the greater security of the situation of Venice greatly contributed to its final triumph. At all times the mudbanks of the lagoon have been a hindrance to communication with its hinterland, but in former times this was a minor consideration, especially since the streams entering the lagoon, the Brenta and Bacchiglione, afforded an entrance to that hinterland for small boats. In modern times this hindrance is overcome by the long railway bridge connecting Venice with Mestre, but the growth of the port was cramped

by the smallness of the site afforded by the Venetian islands, so that the port and industrial area of Marghera on the mainland was established. The population already existing in Venice is accommodated only by building to a great height the houses that border the canals and the narrow foot-paths.

Genoa dates from Roman times, but has always suffered from the fact that the Apennines have hindered its communication with the most populous and productive part of its hinterland. On the other hand, this drawback is counterbalanced by the fact that there is no rival that does not suffer a similar disadvantage, as well as by the fact that the Apennines are here at their narrowest and not very high, and that the roads across or through them lead directly to the most populous part of the north Italian plains with Milan for their centre. The pass formerly used in crossing the Apennines, the Bocchetta, is under 3,000 feet in height. Now two railways (both, however, with heavy gradients) connect Genoa with the plains through mountain tunnels. The commerce of Genoa began to be really flourishing in the eleventh century. The rivalry between it and Venice led to prolonged and repeated hostilities between the two. They inflicted on each other severe losses and injuries, but the commerce of both continued to flourish as long as the geographical conditions to which that commerce was due continued. Notwithstanding the existence of two railway tunnels through the mountains behind, the progress of the port was retarded, chiefly in consequence of the fact that these railways were not able to handle with sufficient rapidity the growing imports of coal and other bulky commodities. On that account it was resolved in 1912 to pierce a large new base-level tunnel, but the War retarded the construction. Savona, the neighbouring rival of Genoa, had in past times the advantage of a lower pass across the mountains behind, namely the Coll dell' Altare, which is taken as marking the limit between the Alps and the Apennines, and has a height of only 1,600 feet; but this advantage, even joined with that of a shorter route to Turin (now nine miles shorter by rail than that from Genoa), has never served to outweigh the fact that the district thus connected with Savona is much smaller, less populous, and less productive than the hinterland of Genoa.

Pisa, the seat of a powerful republic from the eleventh till near the end of the thirteenth century, from 1405 a Florentine port, was the chief outlet of the valley of the Arno, till it was replaced by Leghorn. Even at the time of the acquisition of Pisa by Florence its port had been nearly silted up, and in 1421 Florence purchased Leghorn from Genoa, and by repeated improvements its artificial harbour has been adapted to modern requirements, while Pisa has long been an inland town, important only on account of its memorials of the past.

The populousness of Naples answers to the extraordinary

ITALY [1]

SPECIAL IMPORTS, INCLUDING [2] SILVER BULLION

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29[3]	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Raw cotton	2·08	3·58	3·90	4·12	4·75	7·38	11·06	12·86	23·79	4·4	6·9	7·0	8·9	8·5	9·9	9·4	9·2	10·8
2. Coal and coke	1·64	2·62	3·75	3·89	5·44	5·97	9·81	13·47	16·02	3·4	5·0	6·7	8·4	9·7	8·0	8·3	9·6	7·3
3. Wheat[4]	3·85	2·80	6·77	4·49	5·27	7·67	9·69	14·71	28·66	8·1	5·3	12·2	9·7	9·4[4]	10·3	8·2	10·5	13·0
4. Raw silk	—	—	2·41	3·43	4·62	7·30	8·34	2·50	4·82	—	—	4·3	7·4	8·3	9·8	7·1	1·8	2·2
Thrown undyed	*1·86*	*1·43*	*1·63*	*2·30*	*2·87*	*4·10*	*4·55*	*4·42*[5]	—	*4·0*	*2·7*	*2·9*	*5·0*	*5·1*	*5·5*	*3·9*	*3·2*[5]	—
5. Machinery and locomotives	—	1·55	1·66	1·16	1·99	3·08	7·03	5·86	8·76	—	3·0	3·0	2·5	3·6	4·1	6·7	4·2	4·0
6. Timber	0·98	1·35	1·84	1·08	1·60	2·55	4·06	5·36	6·77	2·1	2·6	3·3	2·3	2·9	3·4	4·2	3·8	3·1
7. Wool, raw and waste	0·99	1·26	1·14	1·05	1·51	2·30	3·29	1·91	9·99	2·1	2·4	2·0	2·3	2·7	3·1	2·8	1·4	4·5
8. Iron and steel	—	—	—	0·77	1·21	1·37	3·01	2·37	9·14	—	—	—	1·7	2·2	1·8	2·6	1·7	4·2
9. Fish	0·87	1·10	1·25	1·22	1·22	1·75	2·80	2·12	4·20	1·8	2·1	2·2	2·6	2·2	2·3	2·4	1·5	1·9
10. Raw hides	1·38	1·56	1·08	1·27	1·60	1·71	2·30	2·82	4·56	2·9	3·0	1·9	2·3	2·9	2·3	2·0	2·0	2·1
11. Woollens, pure	—	1·68	1·79	1·37	0·89	0·94	1·54	1·98	2·71	—	3·2	3·2	3·0	1·6	1·3	1·3	1·4	1·2
15. Coffee	1·13	1·11	1·10	1·23	0·72	0·68	0·99	1·75	4·43	2·4	2·1	2·0	2·7	1·3	0·9	0·8	1·3	2·0
19. Cottons, pure	2·92	2·16	1·58	0·82	0·24	0·20	0·38	1·97[5]	2·28	6·2	4·1	2·8	1·8	0·4	0·3	0·3	1·1[5]	1·0
20. Cotton yarn	1·45	1·09	0·47	0·19	0·15	0·21	0·27	0·12	—	3·0	2·1	0·9	0·4	0·3	0·3	0·2	0·1	—
Average total value	47·26	52·26	55·59	46·19	54·94	74·68	117·75	139·77	200·16									

SPECIAL EXPORTS, INCLUDING [2] SILVER BULLION

Principal Articles.	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Silk, raw and waste	13·51	11·89	12·15	11·97	14·14	19·05	21·13	13·84	17·38	31·4	26·9	31·8	30·8	28·9	31·0	27·6	14·8	11·1
2. Cottons	—	—	—	0·56	1·44	2·75	4·54	7·03	17·16	—	—	—	1·4	2·9	4·5	5·9	7·5	11·0
3. Silks and half silks	—	—	0·71	0·85	1·75	2·78	3·24	4·20	15·40	—	—	1·9	2·2	3·6	4·5	4·2	4·5	9·9
4. Butter and cheese	—	—	0·65	0·86	1·09	1·47	2·27	3·29	4·13	—	—	1·7	2·2	2·2	2·4	3·0	3·5	2·6
5. Olive oil	4·35	3·30	2·66	2·24	1·83	1·57	2·05	2·15	1·69	10·1	7·5	7·0	5·8	3·7	2·6	2·7	2·3	1·1
6. Wine, in casks	0·70	2·53	2·62	1·87	2·37	1·89	2·01	3·10	2·75	1·6	5·7	6·9	4·8	4·8	3·1	2·6	3·3	1·8
7. Eggs	0·24	1·34	0·91	1·19	1·55	1·84	1·87	1·88	1·80	0·5	3·0	2·4	3·1	3·2	3·0	2·4	2·0	1·2
8. Raw hemp and flax	1·21	1·08	0·99	1·25	1·57	1·62	1·84	2·00	3·51	2·8	2·4	2·6	3·2	3·2	2·6	2·4	2·1	2·3
9. Oranges and lemons	1·00	1·24	1·32	1·18	1·02	1·05	1·43	2·79[7]	5·46	2·3	2·8	3·5	3·0	2·1	1·7	1·9	3·0[7]	3·5
10. Raw hides and skins	—	0·42	0·50	0·62	0·74	0·91	1·42	2·00	3·39	—	1·0	1·3	1·6	1·5	1·5	1·9	2·1	2·2
11. Sulphur	1·10	1·17	0·95	1·01	1·55	1·73	1·32	1·56	—	2·5	2·6	2·5	2·6	3·2	2·8	1·7	1·7	—
12. Almonds	0·37	0·49	0·50	0·71	0·75	1·01	1·24	—	4·74	0·9	1·1	1·3	1·8	1·5	1·6	1·6	—	3·0
14. Rice	0·97	1·10	0·39	0·45	0·49	0·68	0·80	1·11	3·46	2·2	2·5	1·0	1·2	1·0	1·1	1·2	1·2	2·2
18. Coral, manufactured	—	2·17	0·76	0·84	1·03	1·06	0·65	0·88	—	—	4·9	2·0	2·2	2·1	1·7	0·8	0·9	—
Average total value	42·95	46·21	38·17	38·91	48·94	61·54	76·44	93·25	156·11									

For notes, see page 507.

ITALY[1]

COUNTRIES OF ORIGIN AND DESTINATION

From	Percentages of Total Value. '71–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29
1. Germany	2·0	7·1	10·2	12·3	12·1	12·9	16·8	17·1	12·0
2. United Kingdom	24·5	22·5	20·4	21·6	19·5	16·2	16·6	16·0	8·9
3. United States and Canada	4·0	4·6	4·9	8·3	11·6	12·2 / 0·1	12·7 / 0·2	13·9	23·0
4. France	28·2	26·1	19·2	13·3	10·4	10·5	9·8	8·6	9·0
5. Austria-Hungary	18·6	15·2	12·8	10·6	10·7	9·8	9·1	8·1	2·1
6. Russia	4·0	3·5	8·4	9·0	9·3	9·7	6·5	6·5	0·9
7. British E. Indies[6]	—	5·5	6·6	6·3	1·7	5·1	1·6	1·4	5·8
8. Switzerland	3·7	4·3	4·8	4·1	3·3	3·2	2·7	2·4	2·1
9. Belgium	1·1	1·7	2·5	2·3	2·3	2·1	2·7	2·3	2·4
10. Argentina	—	—	0·9	1·7	2·1	2·0	2·5	4·0	6·1
11. China and Hong Kong	—	—	—	0·9	2·9	1·0	2·4	1·5	1·0[7]
12. Roumania	—	—	—	0·8	2·1	2·9	2·1	3·7	1·5
Average value in millions sterling	47·66	55·81	58·09	46·19	55·91	74·68	117·7	139·77	220·10

To	Percentages of Total Value. '71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
Switzerland	13·1	11·1	16·1	18·5	16·3	17·5	15·3	10·3	7·8
Germany	1·3	7·7	10·9	15·1	16·2	14·9	11·7	13·9	12·4
United States and Canada	2·7	4·8	6·6	9·2	8·7	11·7	12·7	11·1	10·9
France	38·1	12·8	31·3	11·9	12·8	11·6	10·9	9·2	9·8
United Kingdom	12·2	7·5	9·7	11·7	10·5	9·0	8·4	10·7	10·1
Austria-Hungary	19·3	11·2	9·3	11·5	11·5	9·0	8·0	8·9	3·1[6]
Argentina	—	—	3·0	3·1	5·1	5·7	7·7	7·6	6·3
Turkey in Europe, &c.	0·8	1·4	1·1	1·8	2·1	3·0	3·5	2·9	1·6
Egypt	1·3	1·5	1·0	1·1	1·9	2·5	2·7	2·3	4·5
Belgium	0·5	1·1	2·5	2·2	1·8	2·0	2·6	2·6	1·8
British East Indies[5]	..	1·8	1·4	1·6	2·0	2·0	1·3	1·7	3·0
Russia (in Europe)	2·2	2·0	1·3	1·2	1·0	0·8	1·2	2·1	0·3
Average value in millions sterling	43·24	46·23	40·99	38·91	48·91	61·51	76·11	93·25	156·11

[1] 'Official values' revised annually. Exchange rate for 1921 is calculated on a yearly average at 101·11 lire to £1 sterling.
[2] First period excluding silver.
[3] 1925–29 exchange 105·08 lire = £1. Figures for these years exclude Bullion.
[4] Including temporary imports after 1896.
[5] 1913 only. 'Cotton manufactures' 1913 and 1925–29 instead of 'cottons pure.'
[6] Austria.
[7] Three years only.

productiveness and proportionate density of population of the adjoining plain now mainly comprised in the provinces of Naples and Caserta. For its size this small plain is probably without a parallel in Europe in fertility, and it has had a high degree of importance from this cause from very early times. It was no doubt this fact that caused the Greeks to found on the coast of this plain one of the oldest of their Italian colonies, that of *Kyme*, the Latin *Cumae*, the mother-city of Naples.[1] In the most troubled period of the Middle Ages, the chief seaports in this part of Italy were the Lombard city of Salerno and the independent city of Amalfi—owing, like Venice, a nominal allegiance to the Byzantine Empire—on the south side of the rocky peninsula to the south of the Bay of Naples. From the sixth to the early part of the twelfth century Amalfi was particularly important, and there can hardly be a doubt that its commercial importance was largely due to its relation with this plain to the north, whether those relations were maintained by land (as they could be only with difficulty) or by sea. The fact that its situation made it quite secure against attack on the land side must have formed at that time an important advantage. From the later Middle Ages down to the present time Naples has, however, always been the one great port for this plain, and down to 1860 its populousness was enhanced through its being the capital of a kingdom.

Populations of Communes, 1936 Census

Rome	1,156,000	Bari	197,000
Milan	1,116,000	Messina	192,000
Naples	866,000	Verona	154,000
Genoa	635,000	Padua	139,000
Turin	629,000	Leghorn	125,000
Palermo	412,000	Brescia	123,000
Florence	323,000	Reggio	120,000
Bologna	270,000	Ferrara	119,000
Venice	264,000	Taranto	118,000
Trieste	248,000	Spezia	106,000
Catania	245,000	Cagliari	107,000

MALTA

Malta and Gozo are two densely peopled British islands to the south of Sicily. Valetta, on Malta, is an important fortress, coaling station, and *entrepôt*. The prevailing language is a debased Arabic, that of the upper classes Italian, though English is spreading. Responsible self-government in all local affairs was granted to the islands in 1921. Early potatoes are the chief commercial product, but oranges, cotton and cotton seed, cummin seeds, and squills are also exported.

[1] Greek, Neapolis—'New City.'

ITALY

SPECIAL IMPORTS

	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Foodstuffs	*24·9*	*25·0*	*20·2*
Wheat	12·8	11·8	4·2
Other cereals	0·7	3·1	2·7 [1]
Coffee	2·0	2·0	2·2
Fish	2·2	1·9	2·1
Raw materials	*51·7*	*49·2*	*45·7*
Raw cotton	14·5	9·8	8·7
Coal and coke	8·0	7·5	10·2
Raw wool	3·8	3·6	4·0
Mineral oil products	0·4	2·8	3·6
Benzine, &c.	1·6	1·9	1·7
Timber	2·7	3·2	3·5
Iron and steel (raw and scrap)	1·0	2·4	2·6
Copper, brass, and bronze	2·0	2·1	1·9 [1]
Raw hides	1·8	2·0	2·4
Oil-seeds	1·9	2·2	1·9
Manufactures	*22·1*	*23·6*	*25·4*
Machinery and parts	3·1	4·1	4·7
Chemicals and manures	—	1·9	2·0
Wool and cotton manufrs.	2·7	2·3	1·9 [1]
Silk manufactures	2·2	2·1	1·5
Prepared hides	1·7	2·0	1·4
Total value in 1,000 million lire	*19·40*	*21·36*	*8·56*
Countries:			
Germany	7·8	13·9	15·1
United States	24·0	22·7	12·7
United Kingdom	11·2	10·9	8·9
France	7·6	11·12	5·8
Argentina	7·6	7·7	4·3
India	—	7·9	4·1 [1]
U.S.S.R.	—	1·5	3·7 [1]
Switzerland	2·1	3·3	3·6
Yugoslavia	2·9	4·1	2·9 [1]
Austria	2·4	2·9	2·4 [1]
Roumania	—	2·4	2·3 [1]
Canada	—	5·3	1·1 [1]
Belgium	—	2·4	—
Australia	—	2·6	—

[1] Figures for 1931–34 only.

Par rate of exchange to September 21, 1931, 92·46 lire = £1 ; 1932–35 approximately 60 lire.

ITALY

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*27·7*	*24·9*	*30·9*		
Citrus fruits	2·1	3·8	5·0		
Other fresh fruits	1·5	2·2	3·3 [1]		
Dried fruits	3·2	3·0	3·2 [1]		
Cheese	2·9	2·7	3·2		
Wines and vermouth	2·4	1·8	2·3		
Tomato preserves	1·4	1·8	2·2		
Rice	2·2	2·3	2·1		
Raw materials	*12·9*	*13·2*	*17·6*		
Minerals (including marble and precious stones)	—	4·4	4·5		
Thrown silk	14·0	9·2	3·4		
Hemp	2·3	2·1	2·0		
Hides	1·9	2·2	1·4		
Manufactures	*58·9*	*61·6*	*50·1*		
Cotton manufactures	12·8	10·0	6·9 [1]		
Artificial silk manufactures	—	4·4	5·4		
Silk manufactures	4·8	6·6	5·0 [1]		
Wool manufactures	2·6	3·7	3·6 [1]		
Cotton yarns	2·4	2·1	2·9		
Hats	1·7	2·6	2·0 [1]		
Motor vehicles	2·8	3·1	1·3 [1]		
Total value in 1,000 million lire	*14·38*	*15·17*	*6·68*		
Countries:					
Germany	10·9	15·9	13·3		
United Kingdom	10·4	12·1	10·5		
United States	8·6	13·4	8·8		
France	12·7	12·0	7·8		
Switzerland	11·2	9·5	7·8		
Argentina	5·8	8·0	5·5		
Austria	4·8	3·8	2·7		
U.S.S.R.	—	0·5	2·7 [1]		
Egypt	—	4·2	2·3 [1]		
India	—	3·8	2·2 [1]		
Yugoslavia	2·6	2·5	2·0		
Roumania	—	1·9	1·7		

[1] Figures for 1931–34 only.

The best markets for Italian foodstuffs are Britain and the mainland of Europe north and west of Italy; the export of manufactured goods is especially to the Balkans, the Near East, north Africa and farther East. Italian emigrants, scattered in many parts of the world, are good customers.

THE BALKAN PENINSULA

Under this name we include the greater part of the region lying to the south of the Danube and Save. Together with the adjacent islands belonging to Greece and to European Turkey (and among these Crete), the total area is about one-fourth larger than that of the British Isles. Though the area thus marked off forms, in spite of great diversities in physical features, climate, and products, an easily recognised geographical unit, the political divisions have made it more convenient to treat large portions of it elsewhere. Yugoslavia has already been considered and so have parts of Roumania. European Turkey, Bulgaria, Greece, and Albania are the political areas which remain to be considered here.

The population, except near the chief towns and on some of the islands, is scanty. The surface, including that of the islands, is highly mountainous, the most considerable extent of lowlands being those which border the Danube in the north of Bulgaria. The Save and the Danube form an important line of communication on the north. The other rivers of the peninsula are of little importance for navigation, and the irregularity of the surface throws great obstacles in the way of inland communication by roads and railways.

In view of the difficulties of the ground and the paucity of the population, it seems likely that the existing railways will long remain the only through lines between the north-east of the peninsula and the Ægean. The railway up the valley of the Vardar has, indeed, been continued north-eastwards across the Shar Dagh as far as the Ibar River in Novibazar, but beyond that the difficulties are in the meantime too great to hold out the prospect of a speedy connection with the railway that has already been constructed up the valley of the Bosna to Sarajevo. A carriage-road made by the Russians has, since 1879, crossed the Balkans at the Shipka Pass (4,000 feet), but the descent from this pass on the southern side to the rich isolated valley of Kazanlik is rather abrupt for a railway. The railway which now connects the lower Danube by way of Trnovo and Nova Zagora with Adrianople crosses the Balkans farther east. Notwithstanding the peninsula character of this region, and its southerly latitude, the climate, except that of the islands and the small peninsulas of the south, is, in accordance with the easterly

position, one of great extremes. In summer the temperature is as warm as in Italy, but in winter by far the greater part of the peninsula has more than a month of mean daily temperatures below the freezing-point. The districts in which such temperatures prevail longest are naturally those northern plains and high valleys which are more or less directly exposed to the cold winds from Russia. Even at the port of Salonika the mean minimum temperature is as low as 22° F. In January 1903 the shores of the Gulf of Salonika were frozen.

EUROPEAN TURKEY

At the time of the Congress of Vienna in 1815, European Turkey embraced the whole of the Balkan Peninsula except the Dalmatian seaboard and the small principality of Montenegro, and included also the pre-War Roumania. Successive losses of territory have reduced it to a small area to the north and north-east of the Sea of Marmora and the Dardanelles. In 1923, the Treaty of Lausanne, ratified in 1924 (which modified the Treaty of Sèvres (1920) greatly in favour of Turkey), left Turkey with an area, including what is now the main portion of the state in Asia, of about half a million square miles. Adrianople was once more included in Turkish territory and the European boundary follows, mainly though not strictly, the course of the Maritsa, downwards from about 26° 18′ E. It thus still retains the important city of Istanbul, the site of which is of peculiar historical and geographical interest. As described by D. G. Hogarth, it lies on the southern extremity of a peninsula, whose landward part is all rough hill country, rising northwards to an isthmus, and then falling steeply almost to sea-level again. A continuous wall of broken shaggy heights faces Europe, approaching at either end so nearly to the sea that it can hardly be turned without command of that element. This wall carries the now famous lines of Chatalja. Its strength has been increased by deliberate policy, which has converted the lands both behind and before into almost uninhabited forest. The roughness and, it may be added, the aridity of the hill country immediately behind the city are, no doubt, the explanation of the fact that its fine harbour, 'the Golden Horn,' was so long in acquiring importance in ancient times, and that the settlement of Chalcedon on the opposite coast came first. It required a strong government to develop through this harbour the remoter but rich hinterland formed by the valley of the Maritsa beyond the wall. As the seat of an empire it had enormous commercial advantages as the crossing-place of the sea-route between the Black Sea and the Mediterranean and the land routes through western Asia and the territories north of the Mediterranean. Its present commercial importance lies largely in its being

an *entrepôt* for Asiatic produce, and is likely to increase with the establishment of good government in and the development of the resources of Asia Minor. Istanbul, the present official name of Constantinople, has suffered a decrease in population, even including Pera and Galata and Scutari, to half its pre-War total. This is largely consequent on the change of capital to Ankara.

BULGARIA

The modern Bulgaria began as a principality confined, except round Sofia, to the area north of the Balkans in 1878, when it was withdrawn by the Treaty of Berlin from direct Turkish rule, although remaining tributary to Turkey. Eastern Roumelia, south of the Balkans, was added in 1885. Its complete independence as a kingdom was proclaimed in 1908. After the wars of 1912–13 its territory was extended southwards to the Ægean so as to include the seaport of Dede Agach, but the settlement at the close of the Great War handed this territory over to Greece. About four-fifths of the population are Bulgarian in speech, but of the remaining fifth a large portion are Greeks, between whom and the Bulgarians there is bitter hostility. The Greeks are found mainly in the towns. Several towns on the Black Sea are entirely Greek, and there are other considerable Greek groups in the Maritsa plain and on the lower Tunja.

The northern or Danubian tracts of the kingdom are mainly composed of irregular tablelands cut by deep and narrow valleys. The surface, being mainly composed of argillaceous loam or loess spread over a calcareous subsoil, has a somewhat arid appearance, having no dense covering of trees or rich pastures, except in the depressions, but this is the great grain-growing area of the country. The Balkans, though containing fine forests of beeches and oaks, are full of clearings and rich in valleys surrounded by fields of barley, rye, buckwheat, and potatoes, as well as fine meadows. To the south again, in the upper valley of the Tunja, are extensive plains covered with wheat and maize, varied with vineyards, tobacco and sugar-beet plantations, orchards of plums and peaches. Here also are the famous rose-gardens of Kazanlik, which produce the costly perfume known as attar (or otto) of roses. The Maritsa basin proper is characterised by numerous isolated depressions, where cold air is apt to accumulate in winter, forming 'frost-pockets,' so that the more delicate fruit-trees are forced up to the slopes with a good exposure and good air-drainage. Bulgaria is essentially a land of small cultivators and small proprietors, 87 per cent. of the owners possessing less than 40 acres each, and not one per cent. owning as much as 250 acres. Coal of good quality is mined at

Pernik, south-west of Sofia, with which it is connected by rail. Promising beds of oil shale exist at Brezna, west by north of Sofia. The chief towns are Sofia, the capital, in an isolated basin in the west, Plovdiv (Philippopolis) on the Maritsa, Trnovo, north of the Balkans, the capital of the old kingdom of Bulgaria, which reached the height of its prosperity about A.D. 1000, and the Black Sea ports of Burgas and Varna.

BULGARIA [1]

GENERAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Thousands Sterling.			Percentages.		
	'06–10.	1913.	'25–29.	'06–10.	1913.	'25–29.
1. Cottons	567	299	779	10·1	4·0	7·4
2. Iron and manufactures	442	—	1,466	7·9	—	14·0
3. Cotton yarn	410	249	981	7·3	3·3	9·4
4. Machinery	380	1,112	1,367	6·8	14·7	13·1
5. Wool manufactures	182	288	462	3·2	3·8	4·4
6. Wood	156	151	277	2·8	2·0	2·6
7. Sugar, refined	135	342	—	2·4	4·5	—
8. Petroleum	132	198	121	2·4	2·6	1·2
9. Hides	116	53	481 [2]	2·1	0·7	4·6 [2]
Average total value	5,609	7,572	10,457			

GENERAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	'06–10.	1913.	'25–29.	'06–10.	1913.	'25–29.
1. Wheat	1,439	822	319	30·3	22·0	3·5
2. Maize	682	686	662	14·4	18·4	7·2
3. Eggs	380	330	1,106	8·0	8·9	12·1
4. Flour, all kinds	269	234	292	5·7	6·3	3·2
5. Rye	206	173	104	4·4	4·6	1·1
6. Essence of rose	194	306	295	4·1	8·2	3·2
7. Barley	185	59	278	3·9	1·6	3·0
8. Sheep	151	—	134	3·2	—	1·5
9. Hides and skins	144	152	419	3·0	4·1	4·6
10. Haricots	127	96	116	2·7	2·6	1·3
Average total value	4,744	7,572	9,139			

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES).

From	'06–10.	1913.	'25–29.	To	'06–10.	1913.	'25–29.
1. Austria-Hungary	26·2	29·0	8·1 [3]	Turkey	27·6	4·5	3·2
2. Germany	17·1	19·6	21·2	Germany	18·5	18·1	24·1
3. United Kingdom	16·3	8·9	11·1	Belgium	12·1	16·3	4·3
4. Turkey	13·8	3·4	2·4	United Kingdom	11·6	8·5	1·2
5. France	6·5	6·9	7·5	Austria-Hungary	7·1	15·4	12·7 [3]
6. Italy	4·0	3·5	13·7	Greece	6·3	5·0	12·2
7. Belgium	4·0	2·1	3·3	France	6·1	5·1	5·6
8. Russia	4·0	16·7	0·4	Italy	2·6	4·5	10·9

[1] Declared values c.i.f. to frontier. Special trade including Bullion is given for 1913 and 1925–29. 1925–29 values converted to £ sterling at 670 leva = £1.
[2] Includes leather and skins. [3] Austria only.
Note.—Tobacco, valued at £3,471,000, was the chief export 1925–29.

BULGARIA [1]

SPECIAL IMPORTS

	Percentages of Total Value.				
—	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*8·0*	*6·2*	*4·3*		
Raw materials . . .	*19·5*	*22·2*	*27·0*		
Raw cotton . . .	—	1·7	4·9		
„ wool . . .	—	2·5	4·5		
Mineral oils . . .	3·1	4·1	3·9		
Hides and skins . .	4·1	4·3	3·2		
Oils and fats . . .	3·8	3·0	2·2		
European softwoods .	5·3	2·5	0·2		
Manufactures . . .	*72·3*	*66·4*	*68·5*		
Cotton manufactures	37·7	16·4	15·9		
Woollen manufactures		4·2	4·6		
Other textiles . .		8·4	4·5		
Metals, and manufrs. of .	16·8	14·8	17·0		
Machy., appar. & instrmts.	8·4	13·9	12·6		
Chemicals . . .	—	2·6	4·4		
Dyes and colours . .	—	2·4	4·2		
Stone, pottery, and glass .	—	2·0	2·2		
Wagons, motors, and ships	1·3	2·9	1·4		
Total value in 1,000 million leva . . .	*5·6*	*6·47*	*3·21*		
Countries:					
Germany . . .	20·3	21·9	36·2		
Italy	14·2	13·6	10·6		
United Kingdom . .	13·0	10·2	8·3		
Czechoslovakia . .	5·6	10·2	7·2		
Austria	10·6	7·9	6·1		
Switzerland . . .	0·8	2·2	5·2		
France	7·5	8·0	4·6		
Roumania . . .	7·4	6·3	4·1		
Belgium	5·5	2·2	3·3		
Poland	—	0·7	2·1		
United States . . .	1·2	2·1	1·8		
Netherlands . . .	2·0	2·6	1·6		
Hungary . . .	—	2·3	1·4		
Turkey	3·5	2·2	1·4		

Par rate of exchange prior to September 21, 1931, 673·66 leva = £1; 1932–35 approximately 425.

BULGARIA

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Livestock	*4·0*	*4·7*	*2·4*		
Foodstuffs	*47·3*	*32·9*	*43·8*		
Eggs	11·7	12·4	14·9		
Wheat and flour	4·0	5·5	7·2		
Maize	20·5	6·8	5·3		
Raw materials	*45·9*	*56·7*	*50·6*		
Tobacco leaf	37·3	38·5	39·6		
Hides and skins	2·9	4·7	3·2		
Essence of rose	1·9	3·5	1·6		
Silk cocoons	2·2	2·8	0·5		
Manufactures	*2·8*	*6·1*	*3·1*		
Total value in 1,000 million leva	*4·9*	*6·2*	*3·6*		
Countries:					
Germany	17·7	25·3	36·5		
Austria	10·9	11·7	10·3		
Italy	10·2	9·8	9·1		
Belgium	4·2	4·4	6·1		
Switzerland	4·1	3·2	4·9		
Czechoslovakia	7·8	5·2	4·3		
Netherlands	2·7	3·3	3·0		
Poland	—	7·8	3·8		
France	12·9	5·5	2·8		
Hungary	—	3·2	1·5		
Turkey	4·6	2·6	1·0		
Greece	9·5	10·4	0·8		
United Kingdom	0·5	—	2·4		

GREECE

When first made a kingdom in 1830 Greece had an area of less than 25,000 square miles, but successive enlargements, principally in 1913, as the result of wars with Turkey and Bulgaria, greatly extended its territory. But these extensions have added a larger proportion of aliens in language and religion than of Greeks to the state, at least on the mainland, the added area of 1913 being mainly occupied by Macedonian Slavs and Turks, that of 1920 mainly by Turks. From Salonika southwards, however, the population is mainly Greek. Crete and the islands of the Ægean Sea, all of which, except Rhodes, now belong to Greece, are all mainly Greek in speech. Greece was proclaimed a republic in 1924, and this proclamation was confirmed by a plebiscite. The monarchy was restored, again after a plebiscite, in 1935.

Most of the older Greece is mountainous, the most extensive plains being in Thessaly. A ship canal, opened in 1893, has been cut through the isthmus of Corinth ; in 1933 it was used by 6,000 steamers (2,550,000 tons) and 2,000 sailing-vessels (43,000 tons). Other hindrances to navigation have been removed by the making of a navigable channel 16½ feet deep between the island of Levkas and the mainland (west side), and the widening of the Evripos channel at Chalkis on the opposite coast to 70 feet.

The climate of the whole of the seaward margins of the country is typically eastern Mediterranean, its characteristics becoming more and more pronounced towards the south. That accordingly determines the nature of its agricultural products. Cereals are negligently cultivated even in the areas best adapted for them—Thessaly and Macedonia. About half the land is always in fallow. The most favoured and best cultivated crop is the currant, but of recent years production has been limited by law. Patras is the great centre. The large areas of olive groves previously devoted to the currant vine are now being reconverted to the slow-growing olive. Nuts, figs, oranges, mandarins, and lemons are all important crops. Cotton gives large yields near Levadeia in Bœotia, and this forms one of the crops in the neighbouring reclaimed area formerly occupied by Lake Kopais. There are also successful works of the same nature in the plain of Messenia, and these successes encourage schemes now entertained for the drainage of the Vardar and Struma valleys in Macedonia and Thrace. The chief minerals of the country are the silver-lead and manganiferous iron ore of Laurion (at the south-eastern extremity of Attica), the iron ores of the island of Seriphos, and the chrome ore of Thessaly. Among the minor minerals of the country is the celebrated statuary marble of the Island of Paros. The honey of Hymettus (to the east of Athens),

GREECE[1]

SPECIAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.				Percentage of Total Value.				Principal Countries.	Percentages.		
	1871–75	'06–10	'11–13[2]	'25–29	'71–75	'06–10	'11–13	'25–29		1906–10	'11–13	1925–29
1. Grain	0·90	1·47	1·13	6·19	25·2	24·6	16·6	18·7	1. United Kingdom	12·5	23·8	13·4
2. Cottons	0·34	0·42	0·37	1·71	9·4	7·0	5·4	5·2	2. Russia	18·3	18·4	2·5
3. Coal	0·11	0·40	0·90	1·14	3·2	6·7	13·2	3·4	3. Austria-Hungary	12·2	15·3	—
4. Fish	—	0·28	0·31	0·81	—	4·7	4·6	2·4	4. Germany	9·3	5·9	8·2
5. Wool manufactures	0·17	0·21	0·12	1·14	4·6	3·4	1·8	3·4	5. Turkish Empire	8·5	4·1	2·3
6. Animals	0·09	0·17	0·32 *	1·36	2·6	2·9	4·7 *	4·1	6. France	6·9	4·4	7·7
7. Paper and manufactures	—	0·16	0·16 *	0·58	—	2·6	2·4 *	1·8	7. Bulgaria	6·1	4·9	3·0
8. Wood for building	0·10	0·15	0·33	1·14	2·8	2·6	4·9	3·4	8. Italy	4·2	3·8	6·9
9. Hides and skins, raw	0·27	0·14	0·12	0·41	7·6	2·4	1·8	1·2	9. United States	3·7	2·2	16·4
10. Coffee	0·07	0·12	0·16	0·52	2·0	1·9	2·4	1·6	10. Belgium	2·0	1·6	3·6
11. Sugar	0·17	0·10	0·23	1·21	4·8	1·7	3·4	3·7				
12. Iron and steel	0·08	0·09	0·17	0·78	2·3	1·5	2·5	2·4				
13. Raw cotton	—	0·09	0·09	0·28	—	1·5	1·3	0·8				
Average total value	3·59	5·97	6·80	33·10					Average total value	5·97	6·80	33·10

SPECIAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'06–10	'11–13[2]	'25–29	'71–75	'06–10	'11–13	'25–29	Principal Countries.	1906–10	'11–13	1925–29
1. Currants	1·19	1·48	1·62	2·21	51·4	30·9	29·9	13·3	1. United Kingdom	26·0	21·6	12·2
2. Olive oil	0·26	0·42	0·52 *	0·60	11·2	8·8	9·6 *	3·6	2. Austria-Hungary	9·6	10·5	—
3. Wine in casks	0·04	0·39	0·75 *	1·27	1·9	8·1	13·9 *	7·7	3. Germany	9·5	10·7	22·1
4. Silver-lead ore	0·16	0·33	0·36	0·14	6·7	6·9	6·7	0·8	4. France	8·4	11·6	5·9
5. Tobacco leaf	0·04	0·33	0·70	9·01	1·7	6·9	12·9	54·4	5. Netherlands	8·3	7·8	3·9
6. Manganese iron ore	—	0·23	0·18	—	—	4·8	3·3	—	6. United States	7·6	8·5	21·0
7. Figs	0·11	0·17	0·21	0·24	5·0	3·5	3·9	1·4	7. Italy	7·1	4·8	19·0
8. Zinc ore	—	0·16	0·19	—	—	3·3	3·5	—	8. Egypt	7·1	7·6	5·4
9. Olives	—	0·14	0·16	0·32	—	3·0	3·0	1·9	9. Turkish Empire	5·1	3·0	0·6
10. Valonia	0·05	0·08	0·07	—	2·3	1·7	1·3	—	10. Belgium	4·7	5·7	2·3
11. Sponges	—	0·04	—	—	—	0·9	—	—				
Average total value	2·31	4·78	5·41	16·56					Average total value	4·78	5·41	16·56

[1] 'Official values'; those for 1906–10 based on the average prices in 1899. Rate of exchange for 1925–29 is calculated on a yearly average of 353·5 drachmai to the £ sterling.

[2] Figures are for the two years 1911 and 1913, except in the case of figures marked * which are the average for the three years.

so celebrated in ancient times, is still an important article of commerce.

Before the war with Turkey in 1912–13, and indeed until 1916,

GREECE [1]

SPECIAL IMPORTS

	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Livestock	*2·8*	*4·2*	*4·2*
Foodstuffs	—	*39·9*	*28·0*
Grain	17·6	19·3	15·7
Sugar	5·4	3·4	3·0
Fish	2·5	2·3	2·1
Farm products	—	2·4	1·9
Flour	6·6	3·4	0·1
Raw materials	—	*21·9*	*26·8*
Iron (raw & semi-manufd.)	3·6	2·6	4·3
Other metals, & manufs. of	—	3·9	4·5
Building timber	3·2	3·6	4·3
Coal	2·8	3·6	4·3
Mineral oils	—	4·9	3·9
Manufactures	—	*35·8*	*40·9*
Cotton manufactures	6·3	6·3	6·9
Woollen manufactures	5·0	4·6	4·8
Other textiles	—	4·8	4·5
Chemicals	—	2·8	4·9
Machinery	1·8	3·8	4·4
Paper, and manufrs. of	0·8	1·9	2·8
Total value in 1,000 million drachmai	*8·1*	*11·8*	*8·9*
Countries:			
United Kingdom	15·8	13·0	14·7
Germany	5·8	8·7	13·1
United States	13·8	16·0	8·1
U.S.S.R.	1·0	2·7	6·8
Roumania	4·5	6·7	6·5
Italy	11·0	6·2	5·2
France	8·2	7·5	4·8
Yugoslavia	—	5·9	4·3
Czechoslavia	—	4·0	3·9
Belgium	3·8	3·8	3·6
Turkey	2·6	2·6	3·4
Canada	—	4·8	1·7

Par rate of exchange, 375 drachmai = £1.

Greece was still a country which had no rail connection with any other, so that in trade maritime countries had the advantage. The United Kingdom led decidedly both among the despatching and receiving countries. The fact that Trieste and Fiume, both at that

time Austro-Hungarian ports, are two of the nearest great ports helps to account for the high place then occupied by that empire. The growing prosperity of Germany was reflected in its increasing importance as a consuming country. The decline in the position of France among the destinations is explained by what is mentioned in the previous paragraph.

GREECE

SPECIAL EXPORTS

	Percentages of Total Value.		
	1924.	1926–30.	1931–35.
Foodstuffs	—	*30·3*	*43·9*
Currants (dried)	17·5	13·2	18·6
Raisins	3·5	2·8	5·2
Olive oil	4·0	2·3	5·7
Olives	2·6	1·9	3·1
Wine	4·0	7·3	3·7
Raw materials	—	*63·9*	*52·1*
Tobacco	51·4	55·5	42·5
Hides and skins	2·0	2·4	2·0
Manufactures	—	*4·2*	*3·1*
Total value in 1,000 million drachmai	*3·3*	*6·1*	*5·3*
Countries:			
Germany	26·3	23·1	19·7
United Kingdom	14·7	11·9	17·5
United States	18·1	19·2	14·3
Italy	14·9	18·0	12·5
Netherlands	7·8	4·2	6·8
France	4·8	6·0	5·0
Egypt	4·2	4·5	4·1
Austria	0·3	1·6	3·0
Belgium	2·6	2·4	1·4

Athens, the capital of the country, remains now, as it was in ancient times, the most important town, and its port, Piræus, is the fourth port in the Mediterranean. Patras, in the Gulf of Corinth, has long been the great place of export of currants, and has become a great centre of emigration. Volos, the outlet and inlet of Thessaly, has since 1910 been rendered safe by the construction of a breakwater. Salonika is the inevitable port, not merely for the recently added portion of Greece, but also for eastern Yugoslavia. It has an important carpet industry. Under a convention with Yugoslavia, signed late in 1922, virtually confirming a Serbo-Greek commercial agreement of 1914, Greece ceded to Yugoslavia a site in the port of Salonika to be called the Serbian port, which, though

continuing to be Greek territory, will for customs management and administrative regulation be regarded as belonging to Yugoslavia. The important inland town of Adrianople at the confluence of the Maritsa and the Tunja, the natural centre of the Maritsa basin, was for a short time after the Great War placed under Greek dominion but afterwards restored to Turkey.

Syros, or Hermoupolis, on the island of Syros, among the Cyclades, is a free port, and on that account, as well as on account of its excellent harbour and central situation in the Ægean, is a place of call for vessels trading with the Levant.

ALBANIA

The principality of Albania is a rugged territory, about one-half larger than Wales, to the north-west of Greece, inhabited by a people quite distinct from the rest of the population of the peninsula, who have nearly always maintained virtual independence whoever may have been their nominal suzerains. It was declared independent in 1912 and became a member of the League of Nations in 1920. A republic was declared in 1925. The President was declared King in 1928. Its coast line includes the bay of San Giovanni di Medua with a good anchorage in the north, the ports of Durazzo (Durres), and Valona, and the good anchorage of Butrinto Bay. Valona or Avlona is the best natural harbour and one that is capable of improvement, but it suffers from the natural difficulty of communication with the interior, so that any railway laid there would have to run northwards to join the route of the ancient Egnatian way from Durazzo to Salonika, passing to the north of Lakes Okhrida and Prespa and before reaching Lake Okhrida crossing the Radohoja Pass at the height of 3,600 feet.

The capital Tirana is now reached by a short railway from Durazzo, whence there is a good ferry service to Bari in Italy.

TOWNS OF THE BALKAN PENINSULA

Turkey.		*Greece.*	
Istanbul (1935)	741,000	Athens (1928)	393,000
Idirne (Adrianople)	36,000	Salonika (1928)	237,000
		Patras (1928)	61,000
Bulgaria.			
Sofia (1934)	288,000	*Albania.*	
Plovdiv (1934)	100,000	Tirana (1930)	31,000
Varna (1934)	70,000	Scutari	29,000
Ruschuk (1934)	49,000		

EASTERN EUROPE

The former empire of the Tsars has been broken up in consequence of the War into many states claiming independence, but which resemble one another in being Soviet republics and are now united as the U.S.S.R. or Union of Socialist Soviet Republics. Of the independent states, Poland has already been described. Finland, which had a separate customs frontier even before the War, has become a republic. Quite independent of the U.S.S.R. are the three new Baltic states. These states are Estonia, with Reval for its capital, occupying a territory inhabited by a people closely allied to the Finns on the south side of the Gulf of Finland; Latvia, capital, Riga, round the Gulf of Riga, to the south of Estonia, inhabited by Latvians, who also speak a language distinct from the neighbouring Slavonic language spoken in Russia; and Lithuania, still farther south, whose inhabitants are closely akin to the Latvians, speaking a language of the same group. Vilna is claimed by both Poland and Lithuania; in the meantime Kaunas (Kovno) is the seat of the Lithuanian government. The remainder is under the government which since the revolution of November 1917 has had its seat at Moscow, and theoretically derives its authority from *Soviets* or councils elected by the workmen, soldiers, and peasants of the country so far as its authority extends. The organisation of what has taken the place of the former Russian Empire is actually extremely complicated. It is an intricate confederation of 'Socialist Soviet Republics,' provinces, and other divisions, including a German constituent under the name of the Autonomous Socialist Soviet Republic of the Germans proclaimed at Pókrovsk (on the left bank of the Volga opposite Saratov) early in 1924, and subsequently recognised by the central government.

THE BALTIC STATES

Along the east coast of the Baltic Sea south of the Gulf of Finland are the three small republics which became independent after the Great War.

Estonia has really been a buffer state between Sweden and Russia. In its physical features it is part of the great Russian plain,

and agriculture and dairy farming are the chief occupations of the million people that inhabit its 18,000 square miles. Tallinn, or Reval, is its chief town.

Latvia is larger than Estonia and is about the same size as the Irish Free State, and the population of Latvia reaches about two million. Again, it is mainly an agricultural country with those crops which characterise the northern part of the great Russian plain, such as oats and rye, with smaller quantities of barley, potatoes, and flax. But the forests which cover parts of the country give exports of timber. The output of flax is very important, and it is indeed the leading export in most years, though butter is also significant. The capital, Riga, an important town, at the head of the Gulf of Riga, was once a leading outlet for much of Russia ; it is really the frontier town between western Europe and Russia, in that it is here that the railways change from the standard gauge of western Europe to the broad gauge of Russia.

Lithuania lies to the south of Latvia and agrees with it in its general characteristics and in its produce. After the Great War Lithuania was allotted a tiny strip of coast only, but seized what is the natural outlet of the country, the port of Memel.

SUOMI (FINLAND)

Finland formed part of the Russian Empire from 1809 till the overthrow of the empire, and in 1918 it proclaimed itself an independent republic. In 1920, by a treaty with the Soviet government of Russia, its territory was extended to the north coast so as to include the port of Petsamo, and in June 1921 the Åland Isles, though inhabited mainly by Swedes, were definitely assigned to Finland by the Council of the League of Nations. Its inhabitants, for the most part Finnish speaking, though including some Swedish speaking (about 10 per cent.), are most numerous in the south, and even there the density of population is small. The products are similar to those of the neighbouring parts of Russia. Forests of pine and spruce fir cover more than half the area, the state forests in the north extending over nearly 50,000 square miles. The waterways, natural and artificial, fit for boats are estimated to have a total length of about 1,800 miles, besides about 6,000 miles capable of floating timber. Railway connection with Sweden was established in 1919. It is now proposed to continue the railway, which already extends far into the Arctic Circle, to Petsamo, on the ice-free Northern Ocean. Manufactures, chiefly of wood work and products of timber, including paper, are rapidly increasing. The power-plants increased from 35,000 horse-power in 1885–87 to nearly 320,000 horse-power in 1916, and by 1934 there were nearly 4,000 factories. The capital and chief port is Helsinki (Helsingfors).

FINLAND

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*25·6*	*23·0*		
Coffee	5·2	4·4	4·0		
Sugar	6·7	3·5	2·8		
Wheaten flour	6·3	5·1	2·6		
Fruit, vegetables, plants	—	2·4	2·5		
Rye and rye flour	6·6	3·9	1·2		
Raw materials	—	*26·4*	*32·4*		
Coal and coke	3·2	3·2	5·0		
Fodder and seeds	—	4·8	3·8		
Raw cotton	3·6	2·7	3·1		
Hides, skins, and leather	2·7	4·0	3·0		
Petrol and benzine	1·8	2·9	2·6		
Manures	1·0	2·0	2·4		
Manufactures	—	*47·7*	*44·3*		
Iron and steel	3·0	8·5	9·3		
Other metals, & manufs. of	7·9	3·4	3·3		
Woollen piece goods	3·1	3·7	2·3		
Other textiles and apparel	3·1	5·4	6·1		
Chemicals and drugs	2·4	2·7	5·3		
Machinery	5·5	4·2	4·9		
Electrical machinery	2·3	3·3	3·4		
Ships and vehicles	—	5·0	2·9		
Stone, pottery, and glass	—	2·3	2·3		
Total value in 1,000 million markka	*4·71*	*6·45*	*4·18*		
Countries:					
Germany	29·9	35·9	26·5		
United Kingdom	18·8	13·3	19·8		
Sweden	6·2	7·8	9·7		
United States	13·4	13·8	8·4		
Russia	4·7	2·2	4·2		
Netherlands	4·8	4·8	4·1		
Denmark	6·8	4·6	3·6		
Belgium	2·9	3·2	3·6		
Poland	—	1·7	3·0		
Brazil	2·2	1·5	2·6		
France	2·4	2·8	2·4		

Par rate of exchange 193·23 markka = £1; 1932–35 approximately 220 markka.

Hangö, on the Gulf of Finland west of Helsingfors, has a rapidly growing export trade in butter. Here a large free-port area has been marked out, and is being equipped with the necessary shipping conveniences. The principal ports on the Gulf of Bothnia are Abo, Björneborg, and Vasa. Tampere (Tammerfors) is the principal town in the interior, and is a heavy manufacturing centre.

FINLAND

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs:					
Butter	5·8	7·8	5·1		
Raw materials:					
Timber and wood	44·0	35·2	35·0		
Wood pulp	1·2	16·9	25·5		
Printing paper	7·7	6·8	7·5		
Packing paper	1·8	2·2	2·6		
Other paper and cardboard	2·2	2·3	2·8		
Woodware	2·0	3·5	4·5		
Pit props	3·7	3·1	2·8		
Hides, skins, and furs	2·7	1·9	1·4		
Total value in 1,000 million markka	*4·97*	*6·01*	*4·62*		
Countries:					
United Kingdom	40·3	38·1	46·5		
Germany	9·1	14·2	9·2		
United States	6·1	6·6	8·7		
France	8·1	6·5	5·8		
Belgium	6·4	6·5	5·2		
Netherlands	9·4	8·1	4·3		
Denmark	3·9	2·5	3·1		
Sweden	5·0	2·7	3·0		
U.S.S.R.	4·4	4·2	1·7		

TOWNS OF FINLAND

Helsinki (Helsingfors) (1934)	272,000	Turku (Abo)	69,000
Viipuri (Viborg)	72,000	Tampere (Tammerfors)	59,000

U.S.S.R. (RUSSIA)

During the hundred years which preceded the Great War the Russian Empire had steadily expanded from Europe right across the north of Asia to the Pacific coast, and southwards to the mountainous borders of Afghanistan and Persia, so as to include what is now Russian Turkistan. In October 1917 came the Bolshevist Revolution and the overthrow of the Czarist regime; in the subsequent settlement Finland became independent, the three small Baltic states of Estonia, Latvia, and Lithuania were carved out of what was formerly the Russian Empire and a further tract of country on the western margin became part of the new state of Poland. But there remains within the confines of present-day Russia an area of over $8\frac{1}{4}$ million square miles with a population approaching 170 million. Like the United States, Russia is a continuous mass of land, but has an area nearly three times as large; over 5,000 miles from east to west, and in places nearly 3,000 miles from the borders of the Arctic ocean in the north to the southern frontier. It is ten days' continuous journey in one train from Moscow to Vladivostok; it is three days' continuous journey from Moscow to the southern frontier of European Russia, and nearly two days' journey from Moscow to the northern shores. There are no overseas possessions, so that, vast as is the area of the Union of Socialist Soviet Republics, the commercial geography as a whole is comparatively simple.

If we look at the position of Russia on the globe we notice at once that not only is the whole in the Northern Hemisphere, but even the southernmost part does not reach the Tropics. Russia lies entirely in mid-latitudes in the so-called Temperate Zone and in the Arctic Zone; no part of the country is tropical. Russian central Asia, it is true, has extremely hot summers, and given irrigation can grow tropical and sub-tropical crops; hence the great importance of this area to the country as a whole. Because it does not possess land in equatorial or tropical latitudes one might say that Russia could never be economically self-sufficient; on the other hand, with its enormous home resources, its enormous compact mass of land and the nature of its frontiers, which do not encourage foreign trade, Russia is peculiarly designed to be by nature a self-contained unit.

On the north it is bounded by the Arctic Ocean, along which it has a very long coast-line, but the whole of this is ice-bound in the winter and a sea passage along the northern coast is only possible for two or three weeks in the middle of summer, if at all. Similarly, the very remote Pacific coast of Russia, in the Far East, is ice-bound in winter. Across Asia Russia borders Manchuria, the desert wastes of Mongolia and the heart of Asia with their ramparts of mountains. In the south Russia is bounded by the mountain rampart of Afghanistan, Persia, and Turkey ; its coast-line along the Black Sea is valuable, but this is an inland sea, the entrance to which is controlled by Turkey at the Bosporus and the Dardanelles. On the west Russia is bordered by Roumania, Poland, the three small Baltic countries and Finland ; it has a tiny fragment of sea coast in the neighbourhood of Leningrad, but the gulf on which Leningrad stands is itself controlled by Finland on the north and Estonia on the south and opens only to the enclosed Baltic Sea. Curiously enough, it is only in the extreme north-western corner of this vast country in the Arctic town of Murmansk —now in direct railway connection with Leningrad and Moscow— that Russia has direct outlet to the open ocean.

Physical Features.—In the broadest possible way the whole of Russia is one vast, incredibly extensive plain ; only in the far north-east, or as one approaches the mountainous south-eastern and southern borders, does this cease to be true. Although the scenery changes from boggy arctic wastes through great forests of firs and other conifers to the rolling grain lands and then to the sandy uninhabited deserts, a journey in almost any direction across Russia can scarcely be described as other than monotonous. The country, however, falls into the following major divisions :

(*a*) *The Plain of European Russia* or the Russian Platform, occupying practically the whole of European Russia from the Arctic Ocean to the Black Sea, to the Caucasus and the Caspian Sea. Two-thirds of this great area lie within the basin of the river Volga, which is the longest river in Europe yet with its source in the Valdai Hills, only a few hundred feet above sea-level.

(*b*) *The Caucasus and Trans-Caucasia.*—In the southern part of European Russia, stretching as a rampart between the Black and the Caspian Seas, is the great line of the Caucasus Mountains, rising in places to over 10,000 feet. The Caucasus form such a barrier that they are still uncrossed by railway and only crossed by one motor road. The two railways find their way round either end of the mountain chain. The three small countries of Georgia, Armenia, and Azerbaijan lie beyond the Caucasus (Trans-Caucasia) and are now separate socialist republics within the Union. A western extension of the Caucasus Mountains passes through the mountainous peninsula of the Crimea.

(*c*) *The West Siberian Lowlands.*—This tract of very low, flat country which forms the western part of Siberia is separated from Russia in Europe only by the low rise of the Urals, which can scarcely be called the Ural 'Mountains' and offer little or no barrier to communications.

(*d*) *Central Asiatic Russia* or *Eastern Siberia* is on the whole a low, undulating plateau.

(*e*) *The Far East*, a very remote region of Russia, differs from the remainder in that it consists of a succession of mountain chains, some of them still scarcely explored.

(*f*) *Russian Central Asia*, beyond the Caspian Sea, consists on the whole of a great desert basin, the Turanian basin, bordered by mountains on the south and east, and rising in the north to a low, undulating steppeland which separates Russian Central Asia from Siberia.

Such a land of extensive rolling plains is naturally a land of large, slow, meandering rivers: but Russia is not very fortunate with regard to its rivers. Siberia is drained almost entirely to the Arctic Ocean in the north by the Ob, the Yenesei, and the Lena, and only in the far east does the Amur and its tributaries flow to the open Pacific; thus, the Siberian rivers lead to the frozen Arctic and their lower courses are frozen for many months of the year. Similarly in the northern part of European Russia, the Petchora and the Dwina drain to the Arctic. Russian Central Asia is a land of inland drainage, and so too is all that huge territory drained by the Volga into the Caspian Sea. Those valuable rivers the Don and the Dnieper drain to the Black Sea, and so does the Dniester, which forms the boundary between Russia and Roumania. The river Western Dwina passes through Latvia before reaching the Baltic Sea. Despite the fact that they are all frozen for many months of the year, Russia is making considerable use of her rivers, and reference will be made to the waterways in a later section.

From the point of view of railway and road construction, the rivers form the principal obstructions to through communication across this great plain and necessitate numerous and very large bridges.

Minerals. Russia vies with the United States in the richness and variety of its mineral resources.

The Russian Platform or the Plain of European Russia consists of an underlying block of very ancient rocks which has resisted later earth-building or mountain-building movements, and instead has been subjected to movements of elevation and depression. In times of depression it has been covered by the sea or by large bodies of fresh water which have left on its surface deposits to-day remaining as horizontal beds or beds but very slightly folded. In places, particularly along the north, the ancient rocks of the underlying

block crop out, but over the central and southern regions they are covered by the later deposits. Fortunately the later deposits include in places coal-fields, so that European Russia has three great coal basins. There is one in the extreme north-east in the Arctic region—the Petchora Field—not yet exploited; there is one consisting of brown coal lying to the south of Moscow and known as the Moscow or Tula basin: the third, and by far the most important, is the one known as the Don or the Donetz basin in the south, not far from the Black Sea. Associated with the very ancient rocks which are exposed in the north, are the minerals now being exploited in the Kola peninsula—iron, nickel, and apatite, from which phosphates for manure are made. In the south, at Krivoi Rog near the Black Sea, there are enormous deposits of iron ore, so that Russia ranks second to the United States in its production of iron and steel. The whole of the northern part of European Russia was covered during the Ice Age by a great ice-sheet which, on melting, was found to have scooped out hollows in the surface of the plateau. Some of these hollows are now occupied by lakes, others by marshy tracts or bogs, some of which are yielding peat. Farther south, ridges of sand and gravel run across the country and mark successive stages in the retreat of the ice-sheet and are actually terminal moraines. Beyond this, over central and southern Russia, are vast tracts which are covered by wind-borne deposits laid down by the very cold winds of the glacial period and which are the dust-like loess. It is because of the existence of this fertile soil that so much of Russia is extremely fertile as agricultural land.

The *Caucasus* is a typical folded mountain chain, with old rocks exposed in the centre yielding their quota of metallic minerals, including lead and zinc in the north, iron, manganese, copper, and aluminium on the southern flanks. Similar minerals are yielded along the southern border of Transcaucasia. On the flanks of the Caucasus are the famous oil-fields of Russia—the most important are to the south of the mountains, around the eastern end, near Baku, but another field is also worked near Tiflis. A very important field on the northern flanks is Grozny, and there are other wells near Maikop. Russia ranks second among the world producers of oil, following the United States.

Although the *Urals*, topographically, only form a low divide, the old rocks are brought to the surface and the tract in the centre is a highly mineralised one. Amongst the many deposits of iron ore the most remarkable is the enormous Magnet Mountain, near which the Russians have recently built the great iron and steel town of Magnetogorsk. Other important mineral deposits in the Urals include those of copper, manganese, nickel, gold, and aluminium, but just as on the flanks of the Caucasus there occur the great oil-fields of southern Russia, so it seems from recent discoveries that a

line of oil-fields exists on the flanks of the Urals, and oil has now been discovered at intervals almost from the Arctic Ocean to the Caspian Sea, though the exploitation is still small. On the Siberian flank there is an important coal-field, whilst in the north a recent discovery has been one of the largest deposits of potash salts yet known in the world. Ordinary salt is important in the area below sea-level north of the Caspian Sea (and also in the Crimea) and is obtained from brine-lakes.

The Plain of West Siberia is essentially a low-lying area, formerly a gulf of the sea, now filled up with partly marine and partly land deposits, of the type which cannot be expected to yield any minerals. On the south-eastern margin of this area, however, is the great coal-field of the Kuznetzk basin, now in course of development as an industrial region.

The low plateau of *Central Siberia* consists of a great mass of ancient rock. In places, at least, these ancient rocks are known to yield metallic minerals—there are the famous gold deposits of the Lena basin, and many other metallic minerals are believed to occur. On the flanks of the old plateau and covering part of the surface coal-fields are known to exist; still largely unexplored, there is the Tungusk coal basin on the west, the Lensk basin on the east. Better known are the fields on the south, the Minusinsk basin and the Irkutsk basin and the Kansk basin, all of which have large reserves of coal.

The Far East may be described as still an unknown area. Structurally it is complicated, and it is possible that it may yield important mineral deposits. Gold is known in several places, whilst in the south there are two coal basins; in the island of Sakhalin and in Kamchatka there is oil.

Russian Central Asia, consisting as it does of a central plain with a surround of complex, highly folded mountains, is proving, as one might expect, an important mineral-bearing area. There are small coal basins, oil may occur along the southern flanks, whilst in the ancient rocks there are gold, copper, lead, tin, and zinc.

Although their claims may be regarded as optimistic, it is certain that the U.S.S.R. has enormous reserves of minerals. A recent estimate suggests that the known reserves include half the world's iron ore, a third of the world's oil, 15 per cent. of the world's coal, copper and zinc, three-quarters of the world's manganese, and a third of the world's water-power. It is claimed now also that the production of gold rivals that of South Africa, the world's largest producer.

Climate. Russia constitutes the heart of the enormous land mass of Eurasia. This fact supplies the key to the climatic conditions. The enormous land area becomes intensely cold in the winter, so that the coldest known spot of the earth's surface is in

the heart of Asiatic Russia ; there the lowest temperatures recorded on the earth's surface have been found, *e.g.* — 73° F. at Verkhoyansk. Extremely severe winter conditions are found everywhere in the north and centre, improving slightly as one goes towards the south and particularly towards the south-west in Europe ; even so, all parts of the country have an average temperature below freezing-point for the month of January. Not a single square mile is as fortunate climatically in this respect as the whole of the British Isles.

In summer, on the other hand, the whole of the enormous land mass becomes intensely hot ; temperatures of over 90° F. are sometimes recorded even within the Arctic circle. The deserts of Russian Central Asia suffer the most intense heat, but the whole country may be described as hot.

In winter the great mass of cold, heavy air which rests over the whole area results in a high-pressure centre from which there are out-blowing winds. Contrary to popular belief the snowfall in winter is comparatively light. It is in the spring when the high-pressure area gives place to a low-pressure area that in-blowing winds from the ocean bring their quota of rainfall. Most parts of European Russia and the fertile belt of Siberia thus enjoy light spring rains ideal for grain, followed by the heat of summer. The south-west is the region in which both temperature and precipitation are most favourable to production. Eastwards, around the Caspian Sea and in Russian Central Asia the rainfall drops below 20 inches and desert conditions prevail.

Soils and Natural Vegetation. The Russians have been pioneers in the great science of the study of the soil. They realised that the formation of soil does not depend so much upon the character of the underlying rock as on the character of the climate. The great soil belts of the country correspond with climatic conditions and run across the country from east to west, and really constitute the great natural regions of the country.

(*a*) *The Tundra Belt and the Tundra Soils.*—Here the cold in winter is such that the subsoil is permanently frozen ; the heat of summer is insufficient to do more than melt the moisture in the surface layers, with the result that in summer the surface of the ground is swampy and the soils boggy. We are here beyond the northern limits of the growth of trees and the ground is covered with tundra vegetation, of mosses and lichens, including the famous reindeer moss, though for a short period there may be rich growth of grass and flowering plants.

(*b*) *The Belt of Coniferous or Soft-wood Forest*, with podsol (ash-coloured) soils.—Russia has by far the largest reserves of untouched forest lands of soft timber in the world, and the coniferous forest stretches as an enormous belt from the Finnish border right across

the country to the Pacific Ocean, as far south, roughly, as the latitude of Leningrad. The great difficulty is one of access to the forests. Only the more accessible parts have been seriously worked so far. Unfortunately for Russia, the rivers which can be used for floating timber, at least for a few months in the summer, drain towards the Arctic Ocean. There has been a great increase in the exploitation of timber, even in the more distant forests, and the timber 'ship caravans' of the Arctic Ocean are now piloted by ice-breakers and by aeroplanes which study the weather conditions. Before the War the amount of timber transported increased from 9·9 million tons to about 13·25 millions in 1908, and the chief timber markets then were St. Petersburg, Kronstadt, Moscow, Archangel, and Riga. Now the exportation has greatly increased, but only represents a few per cent. of the annual increment by natural growth. The Arctic coast has become increasingly important. The soils of the forest are light ashen in colour, hence the Russian name podsol, and they are poor in plant food. Thus, when the forest is cleared they are not very valuable for agriculture even when the climate would permit agricultural development. There are also large stretches of boggy soil and tracts of peat.

(*c*) *The Deciduous or Mixed Forest Belt of European Russia* consists partly of coniferous trees and partly of deciduous trees which lose their leaves in winter. Here the soils are rather better and much of the land has been cleared.

(*d*) *The Black Earth Belt.*—The natural vegetation of this belt was a rich grassland with scattered trees. The soil consists of loess very dark in colour because of the large quantity of vegetable matter, and is a soil which is extremely fertile. As a result this is the great grain-growing belt of southern Russia and Siberia, and most of the natural vegetation has been replaced by vast fields of grain. The Trans-Siberian railway runs through this belt, which has such great centres as Omsk.

(*e*) *The Chestnut-Brown Soils and the Steppelands.*—This is land formerly covered with grass rather poorer than in the belt just described, and where the soils, though good, are not quite so rich. This to-day is also a grain-growing region, but not of the same remarkable fertility as the Black Earth Belt.

(*f*) *The Red and Yellow Soils and the Saline Soils* are those characteristic of the drier regions of Russia around the Caspian Sea and of Russian Central Asia. Here in some areas there is very poor grassland formerly inhabited by nomadic stock rearers with their flocks and herds. In the drier parts little grows, and settlement is only possible where water is available for irrigation. This is, however, an important part of Russia because it is the warmest, and here, on irrigated land, tropical and sub-tropical crops can be grown. Along the southern border of the Crimean

Peninsula there is a small, sheltered tract of land where the climate may be described as Mediterranean, and there Russia can grow some, at least, of the Mediterranean products. It is only a tiny tract, however.

Animal Life. The grasslands and the steppes of Russia have been conquered and settled by man, but the great forest stretches to the north, to a large extent, have not. They are still the haunt of numerous wild animals, important because they are fur-bearing animals, and Russia thus provides a third of all the furs which enter into international trade. Some, such as the Russian sable, are now rare, and Russia is to pay attention to the breeding of fur-bearing animals such as the silver fox. Attempts are being made to utilise the wild animals of the north, particularly the reindeer, for the supply of milk, meat, and other produce.

Russia has some fisheries along the northern coast and a few in the Far East, but more important and more famous are the river fisheries, especially of the River Volga for sturgeon, the roes of which yield that famous commodity, caviare.

The People of Russia. The territory of Russia stretches from Europe right across Asia. In the same way the people of Russia are essentially Euro-Asiatic. Much of the failure of western Europe and America to appreciate the true state of affairs in Russia to-day is due to a fundamental lack of understanding of the Russian people. In the first place, although the Russians are extraordinarily varied and include many different racial stocks, three-quarters of the whole are Slavs. During the Middle Ages these Slavs had again and again to withstand the invasions of fierce Mongolians from Asia. Various Turkish and other tribes are to-day the principal inhabitants of central Asia ; they have penetrated to European Russia and to-day remain as large colonies not only on the Volga but in the Ukraine beyond. It was the Slavs of Russia who protected western Europe from these invasions, and we may almost say that the material progress of western Europe in the last five or six centuries has been made possible by the protection afforded by the Russian Slavs.

The militaristic or imperialistic organisation which persisted until the Revolution of 1917 is very largely the result of the long history of strife. In a broad and general way it is comparable to the feudal system as it existed in Britain. . A great gulf separated the peasants from the ruling classes. The much misunderstood Cossacks were the Russians who were liable to military service and in return received arms and money grants from the government and also a reservation of considerable stretches of land ; they might be described as mercenaries, who were employed as the advance guard of colonisation or conquest and as the militaristic police force throughout the country. As in feudal England, there

were serfs—and serfdom was not abolished until 1861, and even after that it was quite common for Russian slaves to be sold in the Far Eastern markets. Down to 1861 the majority of the Russian peasants were serfs attached to the properties of landowners. In that year they were emancipated in a sense, and portions of the landowners' estates were set apart for them, the government paying compensation which was to be repaid by the peasants by instalments. For this repayment, however, not the individual peasants but the *mir* or village commune was made responsible, and the *mir* as a whole had control of the peasants' land. The land was allotted to individuals in scattered parcels so as to give all an equal chance of getting land of equal quality on the whole, and redivisions of the land took place at intervals of years varying in length in different parts of the country. No member of the *mir* was allowed to leave it at his own free will. By the new law of 1906, however, the peasant was made really a free man. He could demand his share of the land in one piece, and buy out his neighbour if opportunity offered. Greater agricultural enterprise was being shown by the more capable. Improved agricultural machinery and implements were being more largely bought and improved methods of farming likewise being adopted. On the other hand, peasants whose holdings were too small were selling them and becoming labourers. Ultimately these would have been absorbed no doubt by the demands of manufacturing industry. The congestion in the agricultural districts where the land was excessively sub-divided was being relieved to some extent by migration to the more thinly peopled tracts in the south-east as well as to Siberia. Formerly emigration to Siberia was allowed only to villagers, but emigration thither from the towns was permitted from the beginning of 1914. The heart of Slav Russia was Moscow, but feudalistic Russia, as far as the ruling class was concerned, appreciated the civilisation of western Europe and established its capital at St. Petersburg, now Leningrad, where communication by sea with western Europe was possible. Imperialist Russia had designs on the conquest of much of Asia, and looked upon the Far Eastern coast with Vladivostok and Manchuria as their ultimate outpost in that direction. The first Russian conquest beyond the Urals was made in 1581 under a Cossack leader called Yermak. The expedition was primarily in the interest of a family of Russian fur-traders, but it received the sanction of the Russian government, and politically was merely a continuation of the process of expansion by which the grand princes of Moscow gradually drove back or subjugated the Tatar invaders of the thirteenth century. The immediate result of the first invasion of Yermak was the fall of the Tatar capital, *Sibir* on the Irtish, about ten miles above the present Tobolsk, which was founded soon after. Small parties of Cossacks, living the life of backwoodsmen, gradually pushed eastwards along

the rivers, and in little more than fifty years after the conquest of Sibir a blockhouse was erected (1632) on the present site of Yakutsk on the Lena. Before the close of that century the Russians had come in contact with the Chinese on the Amur, but a pause of about 150 years took place in their eastern expansion, after they had in 1689, in the Treaty of Nerchinsk, relinquished all claim to the Amur. Further expansion in this direction took place during the Crimean War, and in 1858 the Chinese agreed in the Treaty of Aigun to recognise the Amur and Usuri and a line drawn from the head of the Usuri southwards to Korea as the Russian frontier. In the latter part of the nineteenth century the frontier was pushed farther and farther so as to include what is now Russian Central Asia, and with the completion of the Trans-Siberian railway in 1905 Moscow was placed in direct communication with its Far Eastern possessions. But the prestige of the country received a severe setback on its defeat in the Russo-Japanese war of 1904–5. In the early nineteenth century Siberia was virtually an uninhabited tract, despite the inherent fertility of much of its area. Its severe winters gained it a notoriety which was heightened by its use as a place of exile for criminals. But all who resisted the existing regime were also liable to exile; many of the most progressive elements of the country who resisted political intolerance preferred to make their way to a new country and so went to Siberia as voluntary exiles. The virility of these political exiles has been largely responsible for the amazing growth of settlement, agriculture, and urban life in Siberia, where the rapid growth of such centres as Novo-Sibirsk from about 5,000 in 1897 to nearly 200,000 to-day suggests a comparison with the pioneers who for the same reasons set out to conquer the Middle West of America.

In the twentieth century the organisation of Russia was an anachronism. In 1917 the mode of life and the standard of living of the bulk of the Russian peasants was not very different from that of the agricultural peasants of England in the Middle Ages. In assessing the results of the Bolshevist regime this must be borne in mind: the immense difficulty of conquering the inherent conservatism of the people and of educating vast numbers even to a state of literacy must be remembered. According to the present constitution, private property in land is abolished, all land, forests, mines, waters, live-stock, factories, railways, &c., are state-owned. The unit of government is the Soviet of Workers', Soldiers' and Peasants' Deputies, each constituent state of the Union being governed largely by its own Central Executive Committee and Council of People's Commissaries; subject in turn to the Union Central Executive Committee and Union Council. Under the intensive programme of development of the First and Second Five Year Plans there has been undoubted material progress in all

directions in Russia, but even to-day the standard of living is not in many respects comparable with that which normally exists in western Europe, whatever it may become in the near future. A step forward was made in 1936 with a new constitution.

The Distribution of Population. In 1933 the population of Russia was nearly 166 million: at the census taken in 1897, the population of the same area was only a little over 106 million. Out of the present population rather over 7 million live in the Trans-Caucasian region, some 8 million in Russian Central Asia, the remainder in what may be described as Russia Proper in Europe and in Asia. Although Moscow has a population of 3,666,000 and Leningrad of 2,780,000, and there are 60 other towns with a population of over 100,000, more than half of all the total population of Russia may still be described as rural. We find that this rural population is densest along the famous Black Earth belt stretching from the borders of Roumania across the Urals into Siberia. Along this belt, too, are the great towns of Siberia such as Omsk, Novo-Sibirsk, and Tomsk. To the north and south of this population tends to decrease, but with large urban nuclei in the industrial regions which will be described later.

Occupations of the People. Imperialist Russia was essentially an agricultural country with a limited development of industry concentrated almost entirely in two regions:

i. The immediate neighbourhood of Leningrad; and
ii. The central tract with its centre at Moscow, together with outlying industrial regions on the Don coal-field in the south and associated with oil in the neighbourhood of Baku.

Among the great objectives of the First Five Year Plan (1928–32) and the Second Five Year Plan (1933–37) have been not only the industrialisation of Russia to make the country a self-sufficient economic unit, but also the redistribution of industry in such a way as to locate the great industrial enterprises where power (coal, oil, water-power, or peat) are available or where there is an abundant supply of raw material—particularly heavy and bulky raw material, *e.g.* iron ore—and also to utilise to the full labour resources in different parts of the country. The result will be, in the first place, to have local industries to supply local markets, a requirement very important in a country of such vast distances as Russia. In the old days raw cotton was sent 2,000 miles from Russian Central Asia to Moscow and sent 2,000 miles back as finished cloth; this was obviously an absurdity, hence the establishment of industry in Russian Central Asia itself for the supply of local markets.

Rural Occupations.—34 per cent. of the whole of Russia is occupied by forest, 11 per cent. by pasture, non-agricultural land

31 per cent., arable land 9 per cent., but the area of the country is so vast that this 9 per cent. of arable land represents 500 million acres. The great cultivated belt is the Black Earth belt. Here the crops are wheat—spring wheat, for the winters are too severe for autumn sowing—and barley; on the warmer southern side of the wheat belt maize or corn becomes the main or leading crop; on the northern cooler side the place of wheat is taken by oats or rye—rye, the great bread grain of the peasantry over so much of the country, and which still occupies a larger area than any other grain. It should be noted that the yield of grain crops is still low. North of the latitude of Leningrad climate places a limit on the cultivation of many crops, and although barley takes advantage of the long summer days and will ripen within the Arctic Circle, a very important crop in these northern regions is oats.

Of the chief industrial crops, mention must be made of the cotton lands: Russia can really only grow cotton in Russian Central Asia, and hence it has been an objective to release as much land as possible for the purpose of growing cotton; this has been achieved by improving rail communications to Central Asia, sending food-stuffs and thus releasing land. It is in the Ukraine, that is to say in the south-west of European Russia, that sugar-beet cultivation is particularly important. Farther north in European Russia flax and hemp are leading crops.

The bulk of the cultivated land is now either in collective farms or in state farms. Tracts owned by single owner peasants are limited to about 50 million acres. Thus the primitive methods of agriculture are being replaced by large-scale American methods with the accompanying use of tractors, which are being manufactured in the country itself, particularly in those large towns lying within the agricultural belt, such as Stalingrad and Kharkov. Before the War Russia was a leading exporter of most of these cereal crops; naturally, during the War the export disappeared, and it has not recently been large. When the Bolshevist reorganisation of the country is complete there is every reason to believe, however, that Russian grain will be an enormous factor in world markets.

Amongst animals we may notice the still extensive use of horses in Russia, the cattle which are kept by the tribesmen on the drier steppelands of Asiatic Russia, the dairy cows and the beef cattle which are reared on the cooler northern regions (often in clearings amongst the forests), and also the dairy cattle (for butter) of Siberia and the more fertile valleys of Russian Central Asia. Sheep and goats, to the number of over 50 million, graze on the drier pastures south of the grain belt, whilst pigs are found, as usual, more within the actual grain belt itself.

The enormous forestry resources of Russia have already been briefly indicated, and there is a large working and export of timber

via the northern rivers. This is particularly from European Russia at present, but the exploitation of the Siberian forests is progressing rapidly.

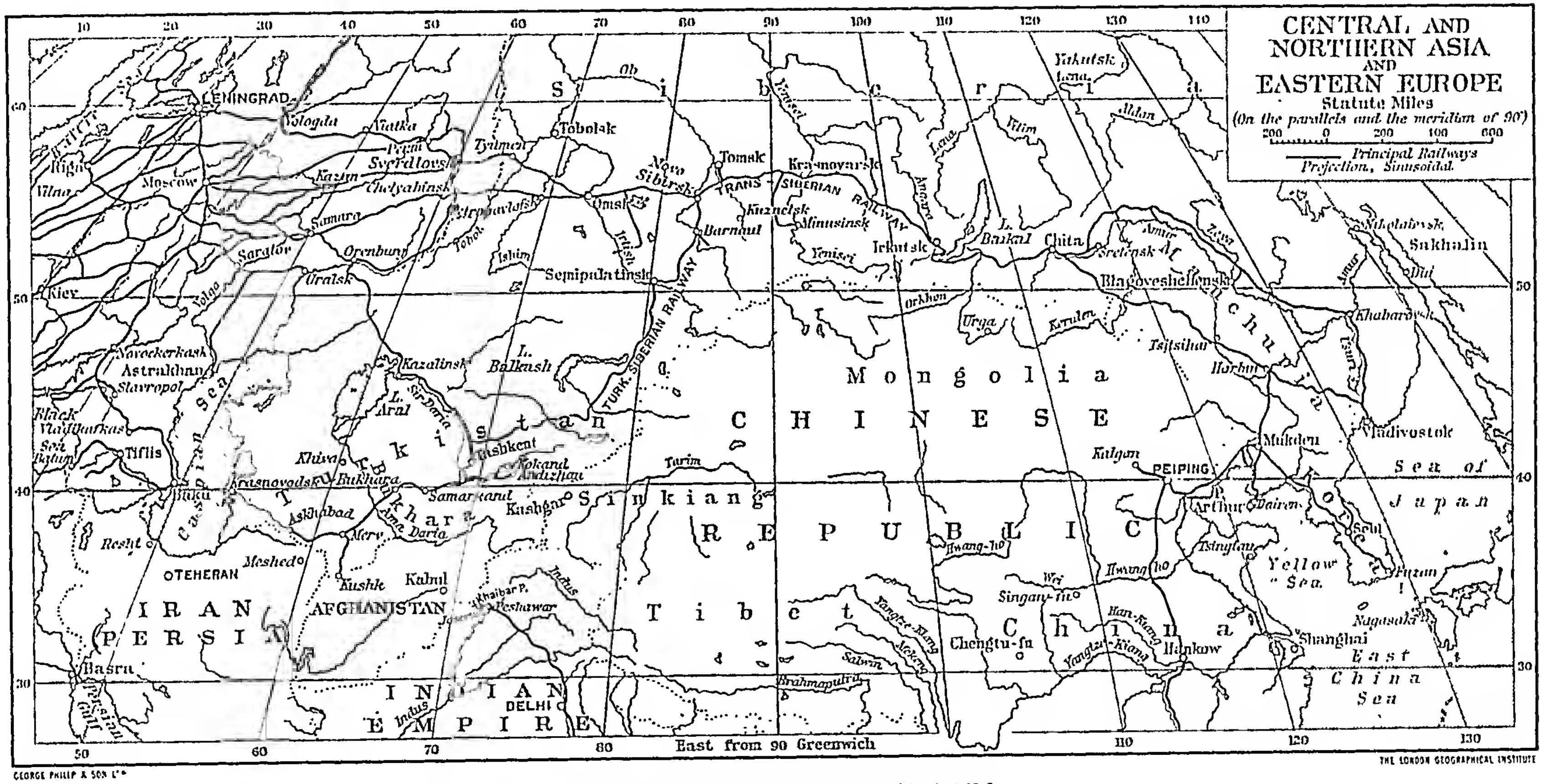
Industry. The industries of Russia may be described particularly in relationship to the industrial areas.

1. *The Central Region around Moscow.*—In Imperial Russia, this region produced something like half of all the manufactured goods produced in the country. To-day the importance of its output is no less, but relative to the output of the whole country it is less significant. Moscow itself is the great centre, to the south is Tula, to the north we find Kalinin, Yaroslavl, and Ivanov, whilst to the east is Gorky. The whole region used to draw its coal from the far south, the Don basin ; much more extensive use is now being made of the rather poor brown coal or lignite of the Moscow or Tula basin. The whole area is being linked together in an electricity grid under the Second Five Year Plan. It is a region associated primarily with the cotton industry and with textiles generally and the manufacture of clothing, together with various metal workings and machinery manufacture and a chemical and miscellaneous industry. Gorky has the great automobile factory of the U.S.S.R.

2. *Leningrad.*—Leningrad is an artificial industrial centre, in that it has no coal nor has it sources of iron ore. It has, however, its seaboard situation, and as an industrial centre its position has been greatly improved in recent years by the construction of hydro-electric works on two rivers in the neighbourhood. There is a shipbuilding industry specialising particularly in timber ships and ice-breakers ; there is the manufacture of miscellaneous machinery, a limited textile industry, but an important clothing industry.

3. *The Ukraine–Don Region.*—This area covers the fine rich Don coal-field, also one of the great iron ore yielding regions, and in addition spreads over the very fertile Black Earth region of the Ukraine. Krivoi Rog has the largest iron ore deposit worked, and the region round the iron-field and also eastwards on the coal-field and at Rostov forms the centre of iron and steel production, and we must remember that the output for the country is now over 10 million tons of pig-iron per year. There are numerous secondary industries which utilise the iron and steel, such as the manufacture of agricultural implements for use in the fertile belt by which the territory is surrounded. We have also the preparation of local agricultural material ; thus there are sugar mills, flour mills, and tanning mills. Kiev, on the Dnieper, has long been the centre of Russian sugar refining and has important leather manufactures.

4. *The Ural Region* is one of the newer industrial areas. The Urals have long been famous for their metallic minerals and for their great reserves of iron ore. 1,200 miles to the east in Siberia is the



Longmans, Green & Co., London, New York, Bombay, Calcutta & Madras

enormous Kuznetzk coal-field, and it is in the present plan in Russia to develop industry at both ends of a line of communication between the two. So there is the huge iron and steel town of Magnetogorsk and the newer one of Orsk at the western end amongst the Urals, whereas the Kuznetzk coal-field has itself become a great centre of industry which is growing rapidly.

5. *The Kuznetzk Coal-field* may be mentioned next. To the north, at Tomsk, are wood-working industries; on the field itself are a great variety of manufactures, including textiles. Textiles are even more important at Barnaul to the south-west; mills at Novo-Sibirsk.

6. *Other Industrial Centres.*—There is the growing industrialisation of the Kola peninsula in the north associated with timber working and with metals: there is the important Trans-Caucasian industrial region around Tiflis with its enormous reserves of oil and its utilisation of some coal together with metallic minerals; there is the growing industrialisation of Central Asia (where are the old market towns such as Tashkent, Samarkand, and Kokand) in the cotton district with the object particularly of supplying the local market.

Of the output of Russia, 70 per cent. is now attributed to manufactures and the remaining 30 per cent. the produce of agriculture, almost the reverse of the position under the imperialist régime in 1913.

Other Inland Towns.—Among the chief inland towns besides those already mentioned are Samara, at the east end of a loop of the Volga, where the river is pushed eastwards by a limestone barrier, long important for its river and eastern land trade, now of importance as situated at the angle of bifurcation of the old southern route of the Trans-Siberian Railway and the line to Orenburg and Turkestan; Saratov, lower down, on the Volga, a centre of the cultivation and manufacture of tobacco; Kharkov, a centre of trade and industry in the Ukraine; Orenburg, on the Ural, the old starting-point of caravans to the east and south-east before the construction of the railway.

Before the Revolution large periodical fairs were characteristic of the inland, and even to some extent of the foreign, trade of Russia. The great fairs of Nizhniy-Novgorod (now Gorky), the most important of which was held annually in August, were international, Asia and Europe there exchanging products. The value of the goods sold at the fair sometimes amounted to about £20,000,000. Irbit, east of the Urals, north-west of Tyumen, was the seat of fairs of great importance to the Siberian fur-trade.

Of Russian towns formerly important but now decayed, two are mentioned elsewhere—Novgorod, once the centre of a great trade in furs and other commodities, and the old Tatar capital of

Sarai. Novgorod, situated on the Volkhof just below its exit from Lake Ilmen, was for hundreds of years—till it was conquered by the Moscow Tsars in 1570—the seat of a principality which probably owed its independence, and in a large measure also its commerce, to the safety it enjoyed amid the marshes by which it was surrounded. By the Volkhof, Lake Ladoga, and the Neva it carried on an active commerce with the Baltic long before Leningrad existed. At one time its population is estimated to have exceeded 100,000, later it dwindled to a fourth of that number. Sarai has completely passed away.

Communications. The enormous size of Russia renders the question of communications one of the utmost importance. The marshy character of a large part of the surface and the want of road-making material (both stone and wood being entirely absent throughout large areas in the south) have stood in the way of the construction of roads. For half the year the substitute for roads is, as usual in such regions, tracks formed by the repeated passage of wheeled vehicles, and apt to be rendered scarcely passable by bad weather. In winter a better substitute is found in the use of sledges. In arctic Siberia, roads of rough shaped logs are commonly used in recent construction. The rivers form natural route-ways, but they are winding and often shallow, and frequently do not flow in the direction required by traffic.

From Tver, the head of steam navigation on the Volga, the direct distance from the mouth of the river is less than 900 miles, the distance by river is about 1,650 miles. Before the introduction of steam navigation, so slow was the rate of progress that it was a matter of months to accomplish the distance between Tver and Astrakhan, and even since steam navigation has been introduced the average rate of speed of the post and passenger steamers down stream is only about 14 miles an hour, up stream about $11\frac{1}{2}$ miles, so that if these rates were steadily kept up through the whole route, about five days would be consumed in the passage between these two places in descending the river, about six days in ascending. The time taken by a tug in drawing a train of cargo-boats must of course be much longer.

Further, no Russian river-port is on an average free from ice for more than ten months in the year. Kherson, at the mouth of the Dnieper, in the latitude of La Rochelle in France, has, on an average, only 280 days in the year ice-free; Astrakhan, in about the same latitude, only 264 days. Rybinsk, the chief grain-port of the upper Volga, has only 219 days ice-free, Leningrad 218, and Archangel, at the mouth of the northern Dwina, only 177 days or less than half the year.

On the Dnieper, the principal water-way to the Black Sea, rocky rapids impeded the navigation for a distance of 23 miles on

that part of the river which flows from north to south in the great bend which the stream makes to the east. Though artificial channels have been constructed since 1853 to avoid these rapids, navigation was little improved till the construction of the great power works under the Bolshevist regime (the Dnieprostroi Dam). Rapids also impede the navigation of the Dniester and Bug, and, above Leningrad, the much more important navigation of the Neva. The navigation of the Volga is liable to be obstructed by sandbanks which accumulate rapidly where any impediment occurs in the way of the current. There are other drawbacks still. The Volga, which with its tributaries affords more than 7,000 miles of inland navigation, does not furnish any direct connection with the ocean. Goods intended for the sea were landed at the former Tsaritsyn, at the point where the river turns south-eastwards to the Caspian, and were transferred by rail to the Don, a river that can be navigated only by steamers of very shallow draught ; now a canal connects the two—reaching the Volga at Stalingrad. The Northern Dvina, a fine deep river, flows through a sparsely peopled region, but in one respect it may be regarded as all the more important on that account as a natural water-way, since only by such means was it possible to develop in such a region an export trade in timber and timber products, flax and other commodities, such as its waters carry.

Even before the War many thousands of river vessels were constantly moving between the Neva and the Volga. Many of these were of more than 1,000 tons burden, but even on the larger rivers vessels of considerable size could be used only during the spring floods. Still, it was significant of the backward state of commerce in Russia generally that the total volume of traffic on the water-ways remained comparatively small. The total quantity of goods transported on Russian rivers increased from 23·3 to 44·8 millions of tons in 1894 to 1910. Under the First and Second Five Year Plans much progress was made with canal construction. In the first place the great Baltic-White Sea canal links Leningrad with the northern ocean ; the Neva navigation is linked with that of the Volga and with Moscow, and much progress has been made with the Don-Caspian canal.

Nearly 70,000 miles of inland water-way are classed as navigable ; this may be compared with 50,000 miles of railway. The extent of the water communication in Russia helped to delay the laying of railways. Down to the close of the Crimean War there were only four railway lines in the country. The principal difficulties in the way of railway construction presented by the physical features have been due to the rivers, many of which have required long bridges. The ascent of the Ural Mountains is so gradual that on the older line between Perm, at the head of steamboat navigation

on the Kama, and Tyumen in Siberia it is scarcely perceptible. On the southern line also the gradients are easy. This line, running from Samara by Ufa and Zlato-ust, is now continued eastwards to join the Trans-Siberian Railway. Its steepest gradient is only 1 in 100, and a short tunnel hereabouts is the only tunnel on the entire route between the Baltic and Irkutsk. A railway to the harbour of Murmansk on the Murman coast in the north-west, which is kept ice-free all the year round by warm water drifted northward by south-westerly winds, was opened during the War.

Despite the enormous size of the country the railway mileage is only double that of the British Isles, and this illustrates the fact that the railway network is a very open network compared with that in western Europe. This obviously accentuates :

(*a*) The importance of developing local centres of manufacture so as to avoid the enormous distances of transport of the goods ; and

(*b*) The importance of developing easy and rapid means of communication by means of air.

It is not surprising to find that regular air routes now cover something like 30,000 miles, and that winter operation is permitted by the fitting of skis to the planes.

The old roadway into Siberia, followed by so many thousands of hapless exiles, was the Trakt, but the most important means of communication in Siberia is now formed by the Trans-Siberian Railway. The first stone of the railway was laid at Vladivostok on May 19, 1891, by the Grand Duke Nicholas, afterwards Tsar Nicholas II., and the line then begun was ultimately continued northwards to Khabarovsk on the Amur. The westernmost section, Chelyabinsk to the Ob, was opened in December 1895, and the next section to Irkutsk was opened in the summer of 1898. Originally the line was intended to follow the valley of the Amur down to Khabarovsk, but the difficulties of construction in the easternmost section of this route, together with the small prospect of economic development in that region, led with the consent of China to the change of route through Manchuria. The line was continued eastwards to Sryetensk or Stryetensk, at the head of navigation of the Shilka, but the railway to the seaboard was made to branch off at Manchuria, 177 miles by rail above Sryetensk. It thence runs south-eastwards to Harbin in Manchuria, and from Harbin south to Port Arthur and Dairen, and east to Nikolskoye on the Vladivostok-Khabarovsk line. The line was completed before the end of 1902, except for a break at Lake Baikal. For some time trains were carried across Lake Baikal in large ferry-boats, but before the end of 1904 the very difficult section round the south end of Lake Baikal was completed. The total length of the railway

from Chelyabinsk to Vladivostok is 3,902 miles, from Moscow b the old southern route of Samara, Ufa, Zlato-ust, and Chelyabins to Port Arthur 5,475 'miles, from Leningrad, 5,882 miles. B connections completed in 1906 Leningrad is brought by Vyatk (now the main line from Moscow also), Perm, Ekaterinburg, and Chelyabinsk within a distance of about 5,500 miles from Vladivostok, 5,700 from Dairen, and 6,000 from Peking by Newchwang and Tientsin. In recent years the whole line has been double tracked, and in 1936, with the completion of the Hankow-Canton railway, it became possible to travel from Calais to Canton by railway. The railway in Eastern Siberia running mainly to the north of the Amur valley from Kuenza on the Shilka a little below Chita to Khabarovsk was begun as a result of the Russo-Japanese war, which caused the control of the Manchurian railway to pass out of Russian hands. It attains its summit level in a tunnel through the Nuksha range at a height of 2,030 feet, and in the neighbourhood of that tunnel the winters are so rigorous that most of the rivers and marshes are frozen solid, but farther east at a lower altitude and in a latitude three or four degrees further south the wide Zeya-Bureya plain already presents to the eye in summer wide-stretching wheat-fields on both sides of the line. In Western Siberia the railway gradients are naturally easy, nowhere as far as the Ob exceeding 1 in 135. Farther east they rise to 1 in 66, and additional difficulties in the construction of the line were presented by the numerous rivers to be crossed. The Yablonoi Mountains east of Lake Baikal are crossed at the height of about 3,400 feet, the temperature there rising in June and July to 77° F. by day and falling to 23° F. at night.

After the construction of the Trans-Siberian Railway there was a rapid immigration into Siberia from Russia, and a considerable development of trade Westwards. In Western Siberia the settlers were allotted free grants of forty acres of land and were exempted from taxes for three years. In 1895 the number of immigrants exceeded 100,000, and in several subsequent years it has exceeded 200,000, the great majority remaining in the western governments. In 1908 the number of immigrants exceeded 758,000, a number more than twice as great as the highest number of immigrants into Canada up to that date, but after that date there was a decline. The railway naturally attracted to it a great deal of the trade with Russia in Chinese tea and silks, and the railway also carried large quantities of Siberian furs to Europe. Locally there developed also a large trade in grain, principally wheat, animals, meat, hides, tallow, wool, and dead game, but the principal export trade was in butter. The trade in butter, carried in refrigerator cars, was developed with remarkable rapidity by the opening of the Siberian railway, and this commodity reached Europe before the War from

much greater distances than wheat—apparently from as far east as the Minusinsk district or about 3,000 miles from the Baltic. The total quantity of Siberian butter exported in 1898 was about 2,500 tons, while in 1912–13 the amount received thence by the United Kingdom alone was about 27,000 tons. This trade was largely in British and Danish hands. Butter imported into Britain from Russia, probably largely of Siberian origin, has been, in recent years, about half this total. The principal articles carried in the opposite direction were agricultural and mining machinery and other manufactures. Passengers are conveyed in luxurious carriages, and Shanghai, Nagasaki, or Yokohama can be reached by this route in eighteen to twenty days from London. In 1927 the direct Riga to Vladivostok weekly service was restored, the journey occupying 10½ days. From Moscow to the Manchurian border is approximately a week.

The chief towns of Siberia show the influence of the railway. At the census of 1897 the only two with a population above 50,000 were Tomsk, capital of Western, and Irkutsk, capital of Eastern, Siberia. Kiakhta, on the Siberian frontier opposite the Chinese (Mongolian) town of Maimachin, was formerly the centre of a large caravan trade with China, importing brick-tea and exporting furs and other Siberian products. Before the War Siberian towns were growing with great rapidity, especially those situated at points where navigable rivers are crossed by the Trans-Siberian Railway. At the beginning of the century Novo-Nikolaievsk was only a small collection of huts ; in 1914 it had a population of 85,000. Tomsk and Yeniseisk doubled their populations between 1902 and 1912. Even more remarkable has been the recent growth. In 1926 only three Siberian towns had a population of over 100,000, by 1933 this had increased to seven—Omsk, Novo-Sibirsk, Vladivostok, Irkutsk, Tomsk, Krasnoyarsk, and Barnaul—of which the first four and the largest are all on the Trans-Siberian.

Seaports. The principal seaport on the Baltic is Leningrad, with Kronstadt. Till the middle of 1885 Kronstadt was the port of Leningrad for all large shipping, but a canal was then opened through the shallow end of the gulf to Leningrad, and from that very year the great bulk of the shipping was transferred to Leningrad, notwithstanding the deficiency of its harbour accommodation. A large proportion of the foreign trade of Russia passes through Leningrad. The harbour of Reval, now the capital and leading port of Estonia, was also deepened and extended, and developed into a great cotton-port, importing large quantities of this material direct from the United States. Riga, now the capital and chief port of Latvia but still an important outlet for Russia, is also having its accommodation for shipping improved, by the regulation of the Düna, or Western Dvina. Its port for large shipping is Ust Dvinsk (Dünamünde), at the mouth of that river.

On the Black Sea the chief port is Odessa, the harbour of which being on the sea itself (east of the Dniester) is not so apt to be closed by ice as the river ports. The shipping both of the port of Nicolaev, on the Bug, and Kherson, on the Dnieper, has to cross the Ochakof Bar, which, however, has been deepened by dredging; both these ports, which were more conveniently situated than Odessa for the grain exports of south-western Russia, grew rapidly, to the prejudice of Odessa. Among the minor Black Sea ports are Kaffa, or Fyedosiya, and Kerch, the last of which had at one time a good deal of business in lightening ships before crossing the bar at the Straits of Kerch or Yenikale. The channel across this bar has been deepened and another entrance to the Sea of Azov has been made by piercing the Isthmus of Perekop at the north of the Crimea. Sevastopol after 1899 became solely a naval port. The chief ports on the Sea of Azov are Taganrog, Azov, Rostov, Berdiansk, and Mariupol, this last being the port of the Donetz coal-field. All the ports mentioned in this paragraph are claimed by Ukraine, one of the constituent states of the U.S.S.R. At the eastern end of the Black Sea, oil is sent by pipe-line from Baku to Batum.

Astrakhan, the chief Caspian seaport, is the centre of the important fisheries of the Caspian Sea and the Volga (sturgeon, &c.). Important fisheries are also carried on all the year round on the Murman coast, to the north-west of the White Sea, and on the Kanin peninsula to the north-east. Murmansk is open throughout the year and has large timber exports, though many small timber ports along the northern Russian and Siberian coasts have been opened during the Second Five Year Plan (1933–1937). Exports from the Far East through Vladivostok are limited.

Caucasia and Transcaucasia.—The area on opposite sides of the Caucasus is now divided into several political divisions. That on the north side includes several provinces of the main Russian Soviet Republic (the R.S.F.S.R. or Russian Socialist Federal Soviet Republic). The region to the south of the range is mainly made up of three Socialist Soviet Republics—Georgia to the west with Tiflis for its capital, and the port of Poti on the Black Sea, Azerbaijan, mainly on the Caspian Sea, on which lies the capital, Baku, but comprising also the Nakhichevan province with the frontier town of Julfa to the south of the eastern portion of the present Armenia, which forms the third of the larger Transcaucasian Republics and lies to the south of the two already mentioned round L. Gokcha. Its capital is Erivan. These three now form a federation, the Transcaucasian S.F.S.R. (capital Tiflis). In the east the southern boundary of these republics coincides with the pre-War boundary of Russian Transcaucasia, but in the west it curves eastwards and then southwards so as to transfer Ardahan, Kars, and Sarikamish from Russia to Turkey. The richest part of this region is that which

occupies the series of valleys between the chain of the Caucasus and the tablelands to the south. It is not only that part which has the climate most favourable to vegetation (a region, accordingly, of forests, vineyards, cornfields, cotton and tobacco plantations, and pastures), but also that which contains the bulk of the enormous mineral wealth of the Caucasus. Irrigation for cotton and other crops is carried on from the Kur and the Aras to the south-west of Baku.

The Armenia mentioned in the preceding paragraph is but a small remnant of the historical Armenia, the region to the north-east of Asia Minor, partly in that peninsula, mainly inhabited by a people distinct in race, language, and religion from the surrounding peoples, but greatly reduced in numbers in recent decades by repeated massacres. The great bulk of their territory is now once more subject to the Turks. It includes the Soviet Republic round L. Gokcha, a freshwater lake, being drained at least in rainy seasons to the Aras, while L. Van, which has no outlet, is so highly charged with sulphate and carbonate of soda that its water is undrinkable. It is mainly composed of tablelands above 4,000 feet in height, cut off from the port of Trabzon (Trebizond) by two parallel mountain ranges, the frequented roads across which leading to north-west Persia cross the inner and higher of the two at a height of upwards of 7,700 feet. The seaward slopes of both these ranges are clothed with forests in which oak, maple, walnut, beech, plane, alder, spruce and other trees, mingled with rhododendrons and azaleas, grow in luxuriant profusion, but the inner slopes and the plateaus present scenes of stony aridity with only steppe grazing. The rivers, of which the most important are the upper courses of the two head-streams of the Euphrates, mostly flow in deep and narrow gorges, so that the cultivable lands are to be found only in occasional expansions on their banks at such crossing-places as Erzinjan and Erzerum. The climate is inevitably one of extremes, the coldest month at Kars, for example, at an altitude of 5,700 feet, having an average mean temperature of about 7° F., the hottest 63½°, the corresponding temperatures at Erivan, 3,300 feet, being 16° and 77°. The warm summers thus indicated allow of the growth of such Mediterranean products as can endure severe cold, so that the exports include, besides wheat, barley, wool (some of fine quality), and oak-apples, maize, southern fruits, melons, raisins, and wine. The imports are mainly manufactured articles, and exceed the exports in value, no doubt largely in consequence of the earnings of the transit traffic. The majority of the inhabitants are a Christian people, descended from the ancient Hittites with Aryan intermixture, and people of the same race are found in the adjacent parts of Persia and the south-east of Asia Minor, a region often known as Lesser Armenia.

Russian Central Asia. Although Russian Central Asia or Turkistan is an integral part of the U.S.S.R., the historical background as well as the geography, the human population as well as their economic development, are so different that some separate account is desirable. The name is given to a vast area to the south of Western Siberia extending to the Chinese, Indian, Afghan, and Persian frontiers. Since January 1895 a single customs frontier has stretched from the Caspian to Chinese Turkistan. The district which contains the headwaters of the Amu is sometimes called the Pamir Plateau, but it is, in fact, a series of lofty plateaus, in some places more than 15,000 feet in height, furrowed by valleys in the west, but descending on the east with remarkable abruptness to the plains of Eastern Turkistan. It is a region difficult of access from all sides, and yet one across which there are commercial routes that have often attained a high degree of importance in the commerce between eastern Asia and Europe (see p. 557).

Russian Central Asia is now divided between the four republics, each a member of the U.S.S.R., of Uzbekistan, Turkmenistan, and Tajikistan in Turkistan, with Kazakistan covering the huge area of the Kirghiz steppes to the north. The steppes are suited only to Kirghiz and other nomads. Turkistan consists in the west mainly of plains and low tablelands, mostly desert. Throughout the region, indeed, cultivation keeps for the most part to the neighbourhood of the mountains, and where carried on at a distance from the mountains it is only by the favour of rivers which have gathered volume enough in the mountainous region to reach a considerable distance into the plains. Three rivers reach large salt lakes. These are the Ili, which enters Lake Balkhash through a swampy delta, the Sir, or Jaxartes, and the Amu, or Oxus, which flow into the Sea of Aral. The Zerafshan, the Murghab, and the Heri Rud, on the other hand, all dry up in the sands. Cultivation is carried on where possible along the banks of these rivers and their tributaries, and where the nature of the ground admits of it large tracts are irrigated by means of their waters. The area of the Merv oasis, which uses up the water at the end of the Murghab, is about 1,700 square miles, that is, less than that of the county of Lancaster; but the actually cultivated portion of this is scarcely one-third of the whole, say, about as large an area as that of the county of Worcester.

Besides Merv, the principal oases are Khiva, fed by streams drawn from the Lower Amu; Bokhara, at the end of the Zerafshan; Samarkand, higher up on the same river, so that an extension of this oasis involves a diminution of the water-supply for Bokhara; Tashkent, watered by streams on the right bank of the Sir; Khojent, and Kokand, on or near the Sir, higher up.

The valleys lying along the eastern mountains, the valley of

the Ili, that round Lake Issyk Kul (both in Semiryechensk), and the upper valley of the Sir (Ferghana), are not only plentifully watered but blessed with a black soil as rich as that of southern Russia; and in these valleys there was in the pre-War years a remarkable development. Russian policy contemplated the keeping of this development entirely under Russian control. No foreign capital was to be allowed in the government, and no foreigners were allowed even to visit it without a special permit. Though the Sir and Amu still serve locally as means of carriage for the products of the region, this commercial development may be said to be entirely due to the construction of two railways. The older is the Trans-Caspian Railway, running from Krasnovodsk, on the Caspian, through the Turkoman oases at the base of the mountains in the north-east of Persia, thence by the oases of Tejen, Merv, Charjui (where the railway crosses the Amu by a bridge opened in 1891), and Bokhara, to Samarkand, and thence by Khojent to Kokand, Margilan, and Andizhan in Ferghana. Branches, each about 200 miles long, run south from Merv to Kushk (close to the Afghan frontier), and north from the Sir valley to Taskhent. In early days the working of the long desert track of this railway was greatly hindered by blown sands, but since about 1896 the sands have gradually been brought under control by promoting the growth of sand vegetation, a prominent feature in which is the *saxaul* (*Haloxylon ammodendron*), a low-growing tree, which yields excellent firewood but grows very slowly. The second of the two railways referred to above is the line from Orenburg running north of the Sea of Aral to Tashkent and giving direct access from Moscow to the heart of Turkistan.

The chief product which these railways serve to transport from central Asia, including northern Persia and Afghanistan, is cotton, which is cultivated throughout the region, but chiefly in the most distant province, that of Ferghana to the north of 40° N., and accordingly further north than the northern limit in the United States. The cotton is mainly produced from American seed, which began to be experimented with in 1878, and is of excellent quality. It is for the cotton of Ferghana that the Orenburg connection is of most importance. By the earlier line this cotton from Andizhan, in order to reach Moscow, had first to be carried 1,274 miles by rail to the Caspian, then across that sea to Baku, and thence 1,618, in all 2,892 miles by rail, or across to Astrakhan on the Volga, and from there by river boats. The Orenburg route from Moscow to Andizhan is only 2,382 miles in length. Under the Bolshevist régime a notable achievement has been the construction of the Turk-Sib or Turkistan-Siberian railway which, by allowing grain and timber to be sent from the Black Earth lands direct to Turkistan, releases more land there for the growing of cotton needed not only

RUSSIA[1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Raw cotton	6·47	7·94	8·56	7·98	7·26	8·87	10·89	10·09	13·33	11·3	16·5	20·5	16·2	11·3	13·3	11·3	7·8	16·8
2. Tea	4·31	4·51	4·15	3·91	4·63	5·10	7·19	6·34	2·76	7·5	9·4	10·0	7·9	7·2	7·6	7·5	4·9	3·5
3. Metal wares	*3·35*	*2·76*	1·17	1·99	3·29	3·11	4·40	1·30	5·37	5·8	5·4	2·8	4·0	5·1	4·7	4·6	1·0	6·8
4. Raw wool[3]	*2·12*	*2·33*	*2·11*	1·28	1·46	2·09	3·95	4·97	5·25	*3·7*	*4·8*	*5·0*	2·6	2·3	3·1	4·1	3·8	6·6
5. Machinery and engines	2·69	1·70	1·92	0·68	1·44	2·11	3·01	9·31[4]	14·39	4·7	3·5	4·6	1·4	2·2	3·2	3·1	7·2	16·9
21. Industrial machinery	—	—	—	—	1·78	0·48	0·82	—	—	—	—	—	—	2·8	0·7	0·9	—	—
6. Coal, coke, &c.	1·35	1·61	1·33	1·47	2·57	2·53	3·35	6·26	0·22	2·3	3·3	3·2	3·0	4·0	3·8	3·5	4·8	0·3
7. Rubber and gutta-percha	—	—	0·32	0·66	1·43	2·19	3·02	3·66	1·84	—	—	0·7	1·3	2·2	3·3	3·1	2·8	2·3
8. Fish, salted or dried	—	—	0·72	0·96	0·99	1·53	2·30	3·48	0·40	—	—	1·7	2·0	1·5	2·3	2·4	2·7	0·5
9. Raw silk	1·03	0·99	0·16	0·56	1·04	1·39	2·05	2·69	—	1·8	2·0	0·4	1·1	1·6	2·1	2·1	2·1	—
10. Wool yarn[3]	—	—	—	1·40	1·60	1·44	1·92	2·12	1·48	—	—	—	2·8	2·5	2·2	2·0	1·6	1·9
11. Chemicals and drugs	1·23	1·79	1·30	1·34	1·36	1·41	1·88	2·67	1·74	2·1	3·7	3·1	2·7	2·1	2·1	2·0	2·1	2·2
12. Plants and seeds	—	—	0·57	0·64	0·95	1·28	1·68	—	—	—	—	1·4	1·3	1·5	1·9	1·7	—	—
13. Cottons[5]	—	—	0·40	0·40	0·53	0·73	1·62	5·67	1·09	—	—	1·0	0·8	0·8	1·1	1·7	4·4	1·4
14. Fruit, fresh or dried	*1·36*	*1·14*	0·60	0·72	0·95	1·10	1·55	—	1·16	*2·4*	*2·3*	1·4	1·5	1·5	1·7	1·6	—	1·5
17. Wines	1·77	1·39	0·77	0·80	1·02	1·05	1·14	1·94	—	3·1	2·9	1·9	1·6	1·6	1·6	1·2	1·5	—
18. Cotton yarn	1·71	1·14	0·95	0·47	0·50	0·50	0·94	1·25	1·62	3·0	2·3	2·3	1·0	0·8	0·7	1·0	1·0	2·0
Average total value	57·00	48·00	41·91	49·35	64·29	66·73	96·09	130·1	79·41									

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Germany	42·3	38·5	29·4	26·6	33·5	35·7	39·5	44·2	23·7
2. United Kingdom	28·5	24·4	24·1	23·7	19·3	16·3	13·7	12·5	10·4
3. China	—	—	7·0	7·3	6·9	8·5	9·5	6·5	5·4
4. United States	3·0	—	9·3	7·8	8·3	7·6	6·9	7·0	18·8
5. France	5·1	4·0	3·7	4·9	4·4	4·3	4·5	4·3	3·3
6. Finland	—	—	2·8	3·4	3·1	3·8	3·5	3·6	1·9
7. Persia	—	—	2·6	2·8	3·3	3·9	3·2	3·1	6·4
8. Austria-Hungary	5·0	5·0	3·9	4·5	4·1	3·7	3·0	2·8	—
9. East Indies	—	—	—	—	—	1·5	1·9	2·5	2·4[7]
10. Netherlands	1·8	1·4	1·0	1·1	1·4	1·7	1·6	1·6	0·6
11. Italy	2·6	2·0	1·8	2·5	1·6	1·6	1·5	0·9	1·4
12. Egypt	—	—	2·7	3·8	2·8	2·2	1·3	0·5	3·3

To	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
Germany	28·5	30·8	24·8	25·2	25·5	23·5	27·1	30·2	21·5
United Kingdom	39·9	32·3	32·9	25·6	20·8	22·2	21·2	20·1	23·9
Netherlands	4·4	6·7	6·9	6·4	10·0	10·9	11·6	11·2	2·8
France	8·6	8·0	6·7	8·3	8·8	6·8	6·6	6·3	5·8
Italy	2·2	2·4	4·5	4·5	5·4	5·5	4·3	3·9	4·1
Austria-Hungary	6·1	5·3	4·2	5·3	4·7	4·1	4·1	4·5	—
Belgium	2·6	4·9	3·8	3·7	3·8	3·9	4·0	3·5	2·0
Finland	—	—	2·6	2·8	4·5	4·4	4·0	3·4	0·9
Persia	—	—	1·3	1·8	2·5	2·7	2·6	3·4	7·1
Denmark	—	1·1	1·4	1·5	1·7	2·9	2·6	2·4	1·5
China	—	—	0·3	0·7	0·9	2·0	2·5	1·9	3·6
Turkey	2·4	2·0	2·9	2·6	2·1	2·1	1·9	2·0	2·1

For notes, see page 551.

RUSSIA[1]

SPECIAL EXPORTS,[3] EXCLUDING BULLION AND SPECIE

Articles.	Average Value in Millions Sterling.									Percentages.								
	1871–75	'81–85	'86–90	'91–95	'96–00	1901–05	'06–10	'11–13	'25–29	'71–75	'81–85	'86–90	'91–95	'96–00	'01–05	'06–10	'11–13	'25–29
1. Corn, flour, and meal	32·45	28·73	34·56	32·41	34·09	40·04	58·74	65·67	10·17	46·2	51·9	51·5	48·8	46·3	49·4	46·3	40·4	13·8
Wheat and flour[6]	*12·99*	*14·74*	*17·65*	*15·38*	*16·75*	*22·90*	*27·07*	*25·16*	*5·75*	*26·9*	*26·7*	*26·2*	*23·1*	*22·7*	*23·0*	*21·3*	*15·5*	*7·8*
Barley	*1·16*	*2·61*	*3·70*	*4·93*	*4·71*	*7·83*	*14·12*	*19·44*	*2·10*	*2·3*	*4·7*	*5·5*	*7·4*	*6·4*	*7·9*	*11·1*	*12·0*	*2·8*
Oats	*2·34*	*4·49*	*4·08*	*3·96*	*3·20*	*5·33*	*4·73*	*5·51*	*0·18*	*4·8*	*8·1*	*6·1*	*6·0*	*4·3*	*5·9*	*3·7*	*3·4*	*0·2*
Rye and flour[6]	*5·65*	*5·89*	*5·88*	*4·31*	*5·67*	*6·68*	*4·65*	*4·49*	*1·22*	*11·6*	*10·6*	*8·8*	*6·5*	*7·7*	*6·7*	*3·7*	*2·8*	*1·7*
Maize	*0·32*	*1·00*	*1·72*	*1·00*	*1·37*	*3·25*	*2·74*	*4·22*	*0·78*	*0·6*	*1·8*	*2·6*	*2·9*	*1·9*	*3·3*	*2·2*	*2·6*	*1·1*
Bran	—	—	*0·50*	*0·67*	*1·11*	*1·36*	*3·43*	*3·53*	—	—	—	*0·7*	*1·0*	*1·5*	*1·9*	*1·9*	*2·2*	—
2. Wood	3·45	3·25	4·13	4·46	5·73	6·95	12·20	16·06	5·79	7·1	5·9	6·0	6·8	7·8	7·0	9·7	9·9	7·8
3. Flax, raw, and tow	6·03	6·03	5·80	6·14	5·01	6·56	7·18	9·29	3·30	12·5	10·9	8·6	9·3	8·0	6·6	5·6	5·7	4·6
4. Eggs	—	—	0·97	1·55	2·93	5·07	6·13	8·98	2·93	—	—	1·4	2·3	4·0	5·1	4·8	5·5	4·0
5. Butter	—	—	0·38	0·37	0·75	3·13	5·04	7·38	3·31	—	—	0·6	0·6	1·0	3·1	4·0	4·7	4·5
6. Oil-cake	—	—	0·53	1·05	1·46	1·99	3·18	3·92	2·10	—	—	0·8	1·6	2·0	2·0	2·5	2·4	3·0
7. Petroleum	—	—	2·10	2·69	3·37	5·00	3·17	4·66[10]	8·37	—	—	3·2	4·1	4·6	5·0	2·5	2·9	11·3
8. Sugar	—	—	1·81	1·98	2·16	2·13	2·77	3·19	2·67	—	—	2·7	3·0	2·9	2·1	2·2	2·0	3·6
9. Cotton manufactures	—	—	0·53	0·84	1·16	2·04	2·43	0·23	2·78	—	—	0·8	1·3	1·6	2·1	1·9	0·14	3·8
12. Linseed	3·76	2·61	2·71	2·23	2·85	0·87	1·32	1·83	—	7·8	4·7	4·0	3·4	3·9	0·9	1·0	1·1	—
13. Hemp	1·63	1·59	1·71	1·56	1·05	0·90	1·17	2·01	—	3·3	2·9	2·6	2·4	1·4	1·0	0·9	1·2	—
17. Wool, raw and spun	1·33	1·38	1·92	0·96	0·76	0·61	0·62	0·99	—	2·7	2·5	2·9	1·5	1·0	0·6	0·5	0·6	—
Average total value	48·25	55·08	67·33	66·36	73·74	90·37	127·2	163·42	73·84									

[1] Russian Empire from 1886 (Finland excluded, and Poland till 1877). Soviet Russia, 1925–29.
[2] Raw wool includes yarn to 1890.
[3] Declared values.
[4] Average for 1912–13.
[5] Cottons and other textile goods in 1925–29.
[6] Excluding flour, 1871–85.
[7] Three-yearly average.
[9] 1911–13, timber and wooden goods.
[10] Average for 1912–13 only.

by Moscow but also by the mills now established to supply the local markets.

The Foreign Trade of Russia. It is very difficult to generalise at the present time regarding the foreign trade of Russia. Russia

U.S.S.R. (RUSSIA)

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Livestock	—	*1·2*	*2·6*		
Foodstuffs	—	*9·1*	*4·9*		
Tea	1·1	3·3	1·9		
Raw materials	—	*52·0*	*28·7*		
Iron and steel (raw and semi-raw)	3·8	3·0	9·2		
Other metals (raw and semi-raw)	—	5·4	7·5		
Wool (raw)	3·5	6·4	5·0		
Cotton (raw)	15·6	14·3	3·8		
Rubber (crude)	5·3	2·3	3·4		
Hides and skins	1·6	4·0	1·6		
Manufactures	—	*37·7*	*43·8*		
Iron and steel	—[1]	3·8	9·4		
Elec. machy. and appar.	—[2]	4·0	5·0		
Agric. machy. and appar.	1·4	5·6	0·5		
Other machy. and appar.	9·6	11·7	27·9		
Total value in million gold roubles	144·1	864·0	526·2		
Countries:					
Germany	30·0	23·8	29·5		
United Kingdom	21·0	9·8	13·3		
United States	24·7	20·0	10·0		
Persia	1·3	6·0	5·7		
Italy	0·4	1·3	3·8		
China	0·0	3·7	3·5		
Netherlands	1·2	0·6	3·5		
France	0·3	3·2	3·1		
Poland	4·5	1·9	2·1		
Egypt	—	2·8	0·4		

[1] Included in iron and steel (raw and semi-raw).
[2] Included in other machinery.

Par rate of exchange 9·46 old gold roubles = £1; 1935 approximately 25 roubles.

has concentrated on the development of her home resources and the Five Year Plans of the country are concerned particularly with the industry at home and its organisation. For this purpose it has been necessary to pay for the services of foreign experts and, to a considerable degree, to import the necessary machinery from

foreign countries. For that purpose the sale of Russian produce has been essential; thus we find that in pre-War Russia by far the most important exports were grain and agricultural produce: taking the present position food-stuffs represent only about an eighth,

U.S.S.R. (RUSSIA)

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1923.	1926–30.	1931–35.	—	—
Foodstuffs	—	*34·0*	*25·9*		
Wheat	10·9	8·3	4·8		
Butter	2·2	3·8	2·7		
Sugar	0·1	3·5	2·5		
Barley	5·1	2·7	2·3		
Raw materials	—	*57·4*	*59·1*		
Mineral oils	6·0	12·4	14·9		
Fur skins	2·2	11·2	7·6		
Timber	14·1	4·4	5·2		
Flax (raw and tow)	4·9	3·8	3·3		
Oil-cake	4·5	2·5	2·3		
Coal	—	1·1	2·2		
Manganese ore	0·2	2·2	1·1		
Manufactures	—	*8·3*	*15·0*		
Wood manufactures	—[1]	10·1	12·3		
Cotton piece-goods	—	4·2	6·1		
Total value in million gold roubles	205·7	835·6	531·1		
Countries:					
United Kingdom	16·8	26·6	22·8		
Germany	29·8	21·2	18·4		
Mongolia	0·0	1·0	6·7		
France	3·1	5·4	4·6		
Italy	3·1	2·9	4·4		
Netherlands	5·7	4·3	4·4		
Belgium	2·0	2·1	4·1		
United States	0·4	3·9	3·8		
Persia	0·3	6·9	3·6		
China	0·0	2·8	2·9		
Turkey	5·0	2·0	1·4		
Latvia	11·6	8·0	1·2		

[1] Included in timber.

animal products together with fisheries and the produce of trappers, mainly furs, another eighth. Timber is important and represents now over 15 per cent., and oil takes a high place also. As indicative of the needs of the country more than two-thirds of all the imports of the country are machinery, including electrical machinery.

Imports are obtained in very large measure from Germany, Britain, and the United States. But the changing character and direction of Russian trade should be followed carefully from the pages of the annual reports of financial papers.

TOWNS OF U.S.S.R., 1933

Moscow	3,663,000	Krasnodar	219,000
Leningrad	2,776,000	Voronezh	212,000
Baku	710,000	Cheliabinsk	210,000
Kharkov	654,000	Grozny	201,000
Kiev	539,000	Stalinsk	200,000
Rostov	521,000	Tula	200,000
Odessa	497,000	Archangel	194,000
Tashkent	491,000	Zaporozhie	192,000
Gorky	452,000	Vladivostok	190,000
Tiflis	406,000	Iuanova-Voznesensk	189,000
Sverdlovsk	401,000	Minsk	181,000
Stalingrad	388,000	Perm	171,000
Dnieperpetrovsk	379,000	Ufa	168,000
Saratov	328,000	Yaroslavl	167,000
Stalino (Yuzovka)	386,000	Irkutsk	159,000
Novosibirsk	278,000	Magnitogorsk	155,000
Kuibishev (Samara)	259,000	Samarkand	155,000
Kazan	259,000	Marinpol	153,000
Omsk	227,000	Torganrog	150,000
Astrakhan	225,000		

ASIA

Asia is the largest and most populous of the continents, but its population is very unequally distributed. Though, taken as a whole, Asia has a much smaller population relatively to area than Europe (about 46 as against 90 to the square mile), four countries in the south-east of Asia, namely India, Java, China, and Japan, with an aggregate area equal to about five-sixths of that of Europe, have a population about twice as great as the population of that continent. The explanation of this difference in the distribution of the population is to be found mainly in differences of climate ; and these differences, again, are due to situation and superficial configuration.

The vast size and the shape of the continent necessarily have the effect of placing the central areas at a great distance from the sea, the chief source of moisture ; but it is to be noted that the existence of another continent continuous with it in the west, and a third lying to the south-west, has an important bearing on the climate of Asia. The European continent receives, to the loss of Asia, the bulk of the moisture brought about by south-west winds from the North Atlantic Ocean, and the continent of Africa has a detrimental effect on the Asiatic rainfall in two ways. First, being situated in latitudes in which there is great rarefaction of the air on the land, and consequently a strong indraught of air from the sea, it diminishes the influx of sea air into the neighbouring parts of Asia. Secondly, it prevents such sea-winds as do blow over the south-west of Asia from being as heavily charged with moisture as otherwise they would be. Hence it is that the monsoons begin, we may say, to the east of the Indus, and hence, too, that these seasonal winds are so all-important in relation to the climate and production of Asia.

The **superficial configuration** of the continent intensifies the contrast between south-eastern and central Asia. The Himalayas, the loftiest mountain range in the world, arrest the summer monsoons of India. North of these mountains, the tableland of Tibet, varying from about 10,000 to 18,000 feet in height, spreads out northwards to the Altyn Tagh and Nan-Shan Mountains, and on the east and south-east breaks up into numerous mountain ranges, which also help to prevent the southern monsoon from reaching the heart

of the continent. Still more effectually deprived of this essential of life are the lower tablelands in the north-central part of the continent varying from about 2,200 to upwards of 4,000 feet in height, and extending to the mountains on the borders of Siberia.

Climate. Outside the monsoon region there is probably not one million square miles, or, say, only about one-tenth of this section of the continent, in which the total rainfall of the year amounts to as much as 16 inches. The areas in which that amount is exceeded lie chiefly in the parts traversed by mountains in the south-west (western Persia, Caucasia, Armenia, and Asia Minor) and in Siberia, in the middle and upper parts of the basin of the Yenisei, and in that of the Ob from about lat. 56° to 62°.

In the drier parts of the continent there are various proofs that at one time the climate was moister than it is at present, and in some of these districts the population was in consequence at one time more numerous. The Sea of Aral is rapidly diminishing in size. Lake Sari-Kamish, once a lake of 4,400 square miles in extent, between that sea and the Caspian, is now divided up into three separate lakes, the aggregate area of which is less than 200 square miles. A series of maps dating back to the year 1784 shows that within the last hundred years or so the lakes between the Irtish and Ob about 55° N. have all shrunk in dimensions, in some cases from an area of 300–500 square miles to groups of small ponds one or two miles wide. In the basin of the Tarim (Eastern Turkistan) numerous ruins and old river-courses testify to the fact of there having been in that region a much greater extent of habitable and inhabited land in former centuries than there is now. In the Thar, or Indian Desert, there are likewise beds of rivers long dried up, seeming to show 'that the waters of the Indus, or of some of its branches, once flowed through it, fertilising what is now a wilderness.' How far such changes may be taken to indicate a more or less continuous process of desiccation is very uncertain.

The effects are probably due in the main to the long secular change since the retreat of the Great Ice Age. For centuries the mountain glaciers which were left behind have yielded a supply of water and the former greater extent of cultivated land in the Tarim basin doubtless depended on these sources of moisture.[1]

Trade routes between Europe and south-eastern Asia. The monsoon region in the south-east of Asia has, however, from the

[1] See on this subject the articles by Professor J. W. Gregory under the title 'Is the Earth drying up?' in the *Geographical Journal*, vol. xliii (February and March, 1914, more particularly with regard to central and western Asia, pp. 293–8 in the March number), and the reply by Dr. Ellsworth Huntingdon in vol. xliv (August 1914). See also Ellsworth Huntingdon's 'Pulse of Asia' and Huntingdon and Vishner's 'Climatic Changes,' and the writings of Sir Sidney Burrard, Dr. Fickner, Sir Aurel Stein and Dr. Emil Trinkler.

very dawn of history been a populous and productive part of the continent, and its commodities have been all the more valued in Europe from being the products of a warmer climate, and hence of a different nature from those native to the West. Indian spices, drugs, and dyes, and Chinese silks, together with precious stones, have been eagerly sought after by European merchants since the time of the Romans, and some of them found their way to the Mediterranean even in early Biblical times (Genesis, xxxvii. 25). The favourite routes by which these commodities were exchanged for European goods differed at different periods. In the time of the Romans Egypt was the transit land for Indian and other Eastern products, and it was in a large measure this circumstance that gave to Alexandria its ancient commercial importance. In the time of Justinian (sixth century A.D.) the Persians had the monopoly of the silk trade. Chinese silks were received either at ports on the Indian Ocean, or by land routes through the Tarim basin by Yarkand, and the Pamir and Kashgar, and the Terek or other passes across the Tien Shan Mountains. About the middle of the seventh century the overthrow of the Persian dynasty of the Sassanidæ by the Mohammedans destroyed the Persian monopoly of the Eastern trade. Soon the Red Sea route came to be preferred once more for Eastern commerce, though it had a rival in the Persian Gulf. By the former route the Eastern goods were sometimes landed on the western shore of the Red Sea and carried to Cairo or Alexandria ; sometimes they were conveyed across the Isthmus of Suez ; and sometimes from ports on the eastern shore of the Red Sea through Syria. By the Persian Gulf route, which attained a high degree of importance in crusading times (the twelfth and thirteenth centuries), commodities reached the Mediterranean by Damascus or Aleppo. In the fourteenth and part of the fifteenth century another route was much frequented—that, namely, through the southern portion of what is now European Russia. That region was then in the hands of Tatar tribes, who for a time maintained friendly relations with the merchants of Italy. The Venetians and the Genoese had colonies on the Black Sea and the Sea of Azov. The Genoese were long established at Kaffa (now again called Theodosia or Feodosia) on the southern shore of the Crimea. Both had colonies at *Vosporo* (now Kerch) at the entrance to the Sea of Azov, and at *Tana* (now Avov) on the Don. From Tana the rivers afforded access to the interior of Russia. Valuable furs, besides grain and forest products, were the principal commodities in this trade, but long inland journeys were also pursued. An eastern route to Astrakhan might be followed, or the traders might ascend the Don to the angle at which it approaches the Volga and thence go eastwards through the Tatar capital of *Sarai* (on the Akhtuba arm of the Volga about 45 miles east of Tsaritsin), then round the north of the Caspian to

the valley of the Amu, and up that valley across the Bamian Pass through Kabul to India, or across the Amu and the Sir, and then by way of Dzungaria to China. Early in the fifteenth century the Black Sea and Caspian routes became greatly hampered through political events, and the fall of Constantinople in 1453 finally restored to the Syrian (Persian Gulf) and Egyptian (Red Sea) routes all their early importance for Eastern traffic. This they retained till the discovery of the sea-way to India, at the close of the century. The opening of the Suez Canal in 1869 has been the means of restoring the early pre-eminence of the Red Sea route. The rapid increase in the amount of commerce carried on by that canal is shown in the table on p. 651. To British shipping and commerce in particular this canal has been of the highest consequence, through the opening of shorter sea-routes to India and other Eastern dependencies of the Empire, as well as to Australia. It is true that the canal has at the same time again enabled Mediterranean seaports to supply themselves directly with many Eastern commodities which they formerly received indirectly from London and other British ports; but it is noteworthy that, as shown in the table on p. 348 exhibiting the proportion of British export trade in foreign and colonial products, the Suez Canal traffic has not had much, if any, effect in diminishing the aggregate value of the commerce for which Great Britain is the intermediary.

TURKEY

The boundaries of the Turkish Republic were laid down by the Treaty of Lausanne, concluded between Turkey and the Allies in 1923. By this Treaty the whole of the mainland of Asia Minor is Turkish and a small district of Europe extending from Istanbul (Constantinople) to the Maritza River and including Adrianople. Even before this treaty, Constantinople had virtually ceased to be the capital of the Turkish Empire. In April 1920 that position was assumed by a government set up at Angora, which proved able to make good its claims. In October 1923 this government proclaimed Turkey a republic, independent of the caliphate, and in March 1924 the caliphate was abolished by a proclamation of the same government. Thus the pre-War Ottoman or Turkish Empire, in which the Sultan was also Caliph or head of the Mohammedan religion, has given place to a republic, essentially Turkish and self-centred, under a dictator, and entirely divorced from religion and in which the formerly powerful monastic orders have been dispossessed. Since the adoption of the Roman alphabet there are official spellings of place names differing considerably from the better known spellings here used. Thus the capital is now Ankara, which it is difficult to recognise as the familiar Angora.

Thus the major part of the Republic coincides with Asia Minor, a tableland about three thousand feet in height, skirted by valleys and plains, some of which almost vie in fertility and beauty with the huertas of Spain. The heart of the tableland is for the most part arid, at best a rolling steppe, and in great part desert. Even the largest rivers of the peninsula (the Kizil Irmak, Sakaria, Gediz Chai) are too scantily supplied with water to be of much service as means of communication. Though the descent from the tableland to the valleys is in many places abrupt, there are numerous openings through which roads and railways can be (and are now being) constructed, and numerous remains of old Roman roads testify to the advanced state of civilisation attained here in ancient times. The tableland is most closely shut off from the lowlands by the range of Taurus in the south-east, and hence the pass through these mountains known as the Cilician Gates, leading down through a gorge cut by one of the head-streams of the Cydnus to the plains of Tarsus and Adana, is a physical feature worthy of special note.

In the interior railways are being extended. Of the western railways that diverge from the port of Izmir, formerly Smyrna, the southern, ascending the valley of the ancient *Meander* past Aidin, with the branch ascending that of the ancient *Cayster*, was constructed by the British ; the others by the French, but are worked along with all the other railways by the Turkish Government. An important line runs from the port of Haidar Pasha, near Skutari, opposite Constantinople, and forks at Eskishehr for Angora and Konia. The line to Angora running eastwards as far as the Sakaria down the Porsak valley was completed in 1892, and opened up a district yielding, among other products, grain, opium, meerschaum (at Eskishehr), wool, and mohair. The grain trade of the place has increased very greatly since the construction of the railway, the farmers receiving three or four times the price of pre-railway days, and being so enabled to buy better agricultural implements and thus increase production still further. It is proposed to continue the Angora line eastwards to Diarbekr, in Kurdistan, passing through a district rich in silver, lead, and copper. By the enterprise of the Republic it has so far been extended to Kaiseri and Sivas. The Konia line was completed in 1896. Alashehr, on the line that now joins this line at Afiun Karahissar (' Opium Black Castle '), is the ancient *Philadelphia*. The continuation of the Konia line is what is known as the Baghdad Railway, constructed before and during the War by German interests but never reaching Baghdad. In crossing the Taurus it, like so many other railways, does not make use of the old pass route, but runs to the north and east of the Cilician Gates, through several tunnels, and then by another tunnel through the Amanus range in northern Syria. Bursa (Brusa), the terminus of the short line from Mudania, on the Sea of Marmora,

has for centuries been a centre of silk-production and of the working of silk both of local and distant origin. In the south-east of the peninsula a railway from Mersina to Adana, on the Seihun (ancient *Sarus*), was completed in 1886. This railway opened up a valley of remarkable fertility, noted now, as in ancient times, for its extraordinarily abundant crops of wheat, and excellently suited for the production of cotton, raw silk, sesame, and other products. The port of Izmir, Smyrna, possesses a fine natural harbour which remains in the neighbourhood of the town as commodious as ever it was, though the approach to it was in danger of being blocked by the deposits poured in by the Gediz Chai (*Hermus*) on the north. This danger, however, has been removed by diverting the mouth of that river westwards.

The nature of the products of the western coastline and valleys of the peninsula and its waters is indicated by the chief exports of Smyrna, the first ten in the order of importance being as follows :—raisins, valonia, cotton, opium, figs, barley (of excellent quality), liquorice, carpets, wool, sponges. The absence of oranges may be noted. The rarity of orange-culture in the peninsula is, in fact, one of the indications of the easterly increase of cold in winter, frequently referred to above (the Eastern Mediterranean type of climate). It has already been mentioned that a considerable proportion of the products of Asia Minor and the regions further east reach western Europe by way of Constantinople, being sent thither from the Black Sea ports of Trebizond, Samsun, Sinope, and Eregli, as well as from Skutari and Izmid.

Great attention has been paid by the present Government to the development of railways and Ankara (Angora) is now linked with the northern coast, giving added significance to the Black Sea coast and its ports.

Towns of Turkey, 1935

Istanbul	741,000	Seyhan (Adana)	76,000
Izmir	171,000	Bursa	72,000
Ankara	124,000	Konya	52,000

CYPRUS, the island in the angle between Syria and Asia Minor, has been under British administration since the Treaty of Berlin in 1878, and in November 1914 was annexed to the British Empire. It was granted the status of a colony in 1925. Cultivation is extending, and the export of wine (chiefly for mixing), carob beans, wheat, sesame, and other products might be largely extended. The vine is principally cultivated round Limasol, on the south coast. Locusts once formed the great plague of the island, but under British direction they have been successfully dealt with. The capital

of the island is Nicosia, in the middle of the great plain, the Mesaoria, which stretches from west to east throughout the island and lies between the narrow northern range of the Kerynia Mountains and the broader southern range of the Troodos Range which rises to over 6,000 feet. Important irrigation works have been carried out here so that Kythræa, Kykko, and Nicosia are oases in a sun-scorched plain in summer and of a land swept by piercingly cold winds in January and February. Spring is a delightful season over the whole island. The chief port is Larnaca on the south coast.

ARAB ASIA AND THE NEAR EAST

The whole of the area of the Near East embraced by Syria, Palestine, Iraq, and Arabia is of extreme interest in the history of commerce. There are three areas in the Tigris and Euphrates valleys where the natural conditions, when properly utilised, have favoured the concentration of population. One is on the right bank of the Tigris, north of 36° N., where the waters brought down from the mountains of Kurdistan were in ancient times spread out so as to irrigate the core of the ancient empire of Assyria round the extensive city of *Nineveh*. Since the fall of Assyria there has been only a feeble irrigation system in and round Mosul, on the opposite bank of the river. Lower down, where the rivers Euphrates and Tigris approach one another, the slope of the ground is such as to lead canals running eastwards and slightly southwards from about 33¼° N. on the Euphrates to about 32¼° N. on the Tigris, and then, still lower, the slope becomes more southerly, so as to lead the water back towards the Euphrates. At a very remote date the whole of this narrow tract between the two rivers appears to have been irrigated by a network of canals converging at *Babylon* on the Euphrates, and making that city the capital of one of the most renowned empires of antiquity. The final decay of this city appears to have been largely due to the withdrawal of a great part of the water-supply of the neighbourhood in order to support the cities that grew up at the ends of the great canals running from the Euphrates to the Tigris north of 33°. In that district, about the meeting-place of these canals, there have again and again been important and wealthy cities, which derived further advantage from the fact that the Diala formed a waterway leading up to one of the chief entrances into western Persia. In ancient times *Seleucia*, some little distance below the modern Baghdad, on the right bank of the Tigris, was, from about 300 B.C., the capital of the Greek kingdom of Syria, and afterwards, till its destruction by Severus in A.D. 198, an important city of the Roman province of Syria. After this event its Parthian rival *Ctesiphon*, on the opposite bank of the Tigris, flourished, first under Parthian and then under Persian rule,

till it was destroyed by the Arabs in A.D. 635. More than a hundred years now passed without an important city in this district, but at last, in 762, Baghdad was founded a little to the north of the ruined cities of Seleucia and Ctesiphon, and by the time of the celebrated Caliph Harun-al-Rashid, so well known from the 'Arabian Nights'—that is, in the early part of the ninth century—the whole district round had been revivified by the restoration of the irrigation works, and Baghdad remained for centuries one of the most magnificent cities of the East in the heart of one of its most productive agricultural regions.[1] The main irrigation canal on the east side of the Tigris, nearly 400 feet wide, was one with which no Egyptian or Indian canal of the present day can compare in magnitude.[2] A careful examination of the plans and levels of this district has led Sir William Willcocks to the conclusion that the ruin of this magnificent irrigation system must have been due to a sudden change in the course of the Tigris, which then seems to have eaten away a portion of this canal, the water in which has now a width of only from 16 to 30 feet. Even after the destruction of this eastern canal there still remained a great canal running from the Euphrates to the Tigris at Baghdad, and serving for navigation as well as irrigation. As late as the latter part of the sixteenth century this was the regular waterway from the upper Euphrates to the Persian Gulf. It was by this route that at that time (1583) the first English commercial expedition, that of John Newberie and his companions, Ralph Fitch, William Leedes, and James Story, proceeded to India.

At all periods when there has been an important civilisation in any part of the plains bordering the Tigris and Euphrates there have been important trade-routes passing thence to the northern part of the Syrian seaboard. It was this seaboard which at a very remote period of antiquity was occupied by the Phœnicians, a people who, according to their own traditions, confirmed by the evidence of remains of various kinds, originally came from some district bordering on the Persian Gulf. Numerous remains on the Bahrein Islands show that, if that was not their original home, they must at one time have been settled there. The names of two of the Bahrein islands, *Tyrus* and *Aradus*, were repeated on the Phœnician coast. If they came from the Persian Gulf they no doubt retained the tradition of the way thither. In any case the wealthy empires on the Tigris and Euphrates formed the most valuable part of the hinterland of that seaboard. From Nineveh the trade-route would pass by way of the modern Aleppo and descend on one of the northern

[1] See the translation of a description of Mesopotamia and Baghdad written about A.D. 900, with annotations by Guy Le Strange, in the *Jour. Roy. Asiat. Soc.*, 1895, with map (p. 33).

[2] Sir Wm. Willcocks, *The Restoration of the Ancient Irrigation Works of the Tigris* (Cairo, 1903), p. 12.

ports such as Aradus (now Ruad) or Tripoli. From Babylon the route necessarily first ascended the valley of the Euphrates. The untraversable desert on the west inevitably barred direct connection with the sea. But having reached a point on the Euphrates somewhat north of 35°, traders could make use of a long furrow with water holes leading south-westward to Damascus. The modern trans-desert motor-track runs almost directly from Baghdad to Damascus. Now it is to be noted that Damascus can be conveniently reached from Sidon and still more conveniently from Tyre without crossing either Lebanon or Anti-Lebanon, and there can be no doubt that special importance was conferred on these two ports, at both of which local conditions favoured the construction of harbours suited to the small ships of the time, by their relation to that ever-flourishing oasis. That oasis must have been the cause of bringing a large proportion of the commerce between the Mediterranean and the Euphrates Valley by the route above referred to, and hence of giving a special stimulus to the textile, metal, glass, and other industries to which commerce gave rise on the Phœnician seaboard. For thousands of years the towns on the Phœnician seaboard had the advantage of lying between the highly-developed civilisations of Mesopotamia, on the one hand, and the Mediterranean on the other hand, the Mediterranean including the equally ancient and brilliant civilisation of Egypt together with a multitude of coasts and maritime valleys supplying in abundance food and raw materials. Tyre was destroyed in 332 B.C. by Alexander the Great, and the whole Phœnician seaboard then fell under Greek rule. But that did not put an end to the importance of this coast. Tyre flourished again in Roman times, though Beirut (*Berytus*), which is the port of the most extensive strip of fertile coast in Phœnicia, had already become an important rival. Once more it flourished in the Middle Ages, especially during the period (twelfth and thirteenth centuries) when the Crusades gave Venetian and other Christian merchants greater security on this seaboard. At this time, however, Aleppo in the north had as powerful an influence on trade-routes to the Euphrates as Damascus in the south, and hence the northern ports were also much frequented. Latakia was the favourite port for that centre till its commodious harbour was destroyed by an earthquake in 1183. Its place was then taken by Alexandretta, but even Tripoli, far to the south as it lies, was also frequently made use of by merchants on their way to Aleppo. Even the discovery of the sea-way to India did not altogether put an end to the distant trade that passed through this seaboard. The Portuguese, who discovered that route, took from the Arabs the island of Ormuz at the mouth of the Persian Gulf (1515), and, retaining it for upwards of a hundred years, still preserved a great deal of the trade that it had long possessed, in virtue of its situation at a point whence a great

trade-route passed northwards into Persia and north-westwards t Mesopotamia and the Mediterranean. The great trade of the plac is described by Ralph Fitch, the chronicler of the first Englis expedition to India in 1583. The island lost its importance when i was taken by the Persians, aided by the English, in 1622, but th memory of its former glory lived long enough for it to be taken by Milton as a symbol of oriental wealth and splendour.

It can hardly be considered surprising that the Arabs, the people occupying the vast peninsula between the two avenues leading from the Mediterranean to the East, should have been great traders from the earliest times down to the present day. The valley of Hadramaut in the south of Arabia was the principal source of frankincense, one of the oldest and most valuable articles of commerce. Arab ships at an early date brought spices from India and gold from South Africa. They had equal experience in caravan traffic by land, a natural result of the character of their country. Another result of this little circumstance was their knowledge of the value of running water and the skill in irrigation which they developed at an early date. At Marib, in Yemen, some eighty miles north-east of Sanā, there are remains of a huge irrigation dam two miles long and about 120 feet high, believed to have been originally built about 1700 B.C. When, after the death of Mohammed in A.D. 632, the Arabs, acting under a strong religious impulse, spread east and west from the centre of their faith, their skill in irrigation and commerce greatly assisted them in founding the brilliant Arab civilisations that grew up at various centres. It should be noted that the area which their conquests ultimately embraced, extending from the Spanish peninsula through north Africa to the valley of the Indus, was almost confined to countries in which irrigation was a matter of the first importance: In Spain they maintained themselves longest in the region in which irrigation was most valuable. In north Africa at Kairwan they established a brilliant capital on a site where none but Arabs would have thought of doing so. In Egypt and in Syria they acquired the succession to the irrigation systems of the Nile valley and Damascus. In Mesopotamia they renewed the old irrigation works about the confluence of the Tigris and Diala. On old caravan-routes between the Indus valley and Mesoptamia there are numerous remains of undoubted irrigation works of Arab origin. In the west commerce was carried on by them for the most part chiefly by land-routes. In the earlier centuries of their expansion they did indeed make important conquests (Sicily, Crete) in the Mediterranean, but there Christian Powers in the end outstripped them at sea, and an Arab historian tells us that the rise of Tunis, situated at the head of an easily defended inlet, at the expense of Carthage in the early part of the eighth century, was largely due to the fear of attacks from Europe to which Carthage in its more

exposed situation was open. In the Indian Ocean, however, Arab sailors were very adventurous. Immediately after their conquest of Syria and Persia, in A.D. 635 or 636, they founded on the Shat-el-Arab the port of Basra, which then became the intermediary between Mesopotamia and the East, and grew in importance after Baghdad had arisen and begun to flourish on the Tigris. In the centuries immediately preceding the Arab conquest, Chinese ships had frequented the Persian Gulf and even ascended the Euphrates. From the Chinese the Arabs learnt the use of the mariner's compass, and with its aid made bold voyages right across the Indian Ocean and the China Seas. They ultimately had regular trade relations for a time even with Khanpu on the Gulf of Hangchow, and a report from an Arab traveller of as early a date as 851 has come down to us showing a wonderful amount of knowledge even of the remote interior of China.

SYRIA considered geographically and historically includes the whole of the area to the south-west of Asia Minor, south of Kurdistan and west of Mesopotamia, from which the habitable parts are separated by desert. The whole of this area was surrendered by Turkey under the Treaty of Sèvres, and the northern half of it has been entrusted under mandate to the French, the southern, including Palestine, to the British, the division between the two running eastwards from Ras el Abiad to the south of Tyre, then in a loop northwards at the Jordan valley so as to include in the British area the springs of Jordan at Banias, and finally from the south end of the Sea of Galilee east by south to the south of the Hauran. The French area, whose limit on the north-west is formed by the lower course of the Jihun, thus includes Damascus, the capital, Homs, Aleppo, and Aintab, as well as the ports of Tyre, Sidon, Tripoli, Beirut, Latakia, and Alexandretta, while the British includes Jerusalem and Nablus, with the seaports of Jaffa, Haifa, and Acre. The name Syria is now normally restricted to the area of the French mandate.

Syria is a region of varied characters and falls into four belts parallel to the Mediterranean coasts. The narrow coastal plains are small but sheltered, well-watered by winter rains, and fertile—the plains of Tripoli and Sidon have world-famous orange groves, the plains of Beirut huge olive orchards, the plains of Latakia vast tobacco fields. The second division consists of a succession of mountain blocks, separated by passes which afford routeways from the coast towns to the interior. The mountain blocks are often wild, inaccessible country, partly forested (*e.g.* the famous Cedars of Lebanon), sparsely inhabited by peoples who retain much of their former independence.

The third division is the great central depression, partly marshy and unhealthy but in general fertile and well cultivated. The

temperate cereals are the main crops, with mulberry-trees (and consequent silk production) in the Plains of Antioch. On the banks of the rivers liquorice-root (growing wild) is gathered in winter. The fourth division is the edge of the great plateau which fades eastwards into the Syrian desert. Where water is available the land is fertile as around Aleppo or in the great oasis settlement of Damascus; elsewhere the land is wind-swept and cold in winter, scorched in summer. Hail and snow fall on the hills even in Palestine, and occasionally there are winters of great severity. In Northern Syria a very severe winter occurred in 1910–11, when the district round Aleppo was buried for forty days under snow and ice, and all traffic was stopped.

Syria suffered to a considerable extent from misrule, and its present population is still far below what it must have been in the past. To-day the most populous and flourishing part of Syria is the district between Lebanon and the coast, where Beirut is the chief port. A good road has long connected this port with Damascus, crossing the Lebanon at the height of 5,200 feet and passing through Anti-Lebanon in the gorge of the Barada. Since 1895 a railway with a gauge of 3 ft. 5¼ ins., built with French capital, has followed the same route, and a line on the same gauge subsequently built now runs from Damascus southwards to the wheat-growing district of Hauran, in which there is still room for extensive settlement. This latter district is now, however, much better served by the railway from Haifa, at the base of Mount Carmel, through the Hauran to Damascus, which has much easier gradients. North of Beirut the chief port is Alexandretta, the port of Aleppo. To Alexandretta, which is to be converted into a great commercial port, a branch from the Baghdad Railway runs southwards. The majority of the inhabitants of Syria are Arabs; indeed, a Syrian is really an Arab who has dropped the life of a nomad and settled on the land or in the town. The majority are Mohammedans, but there are many Syrian Christians.

Palestine is rather larger than Wales and has a population of about a million and a quarter. Two-thirds of the people are Mohammedans—Arabs or Syrians—a quarter Jews, and the remainder Christians. By the famous Balfour Declaration of 1917 the British Government expressed its sympathy with the view that Palestine should be made a national home for the Jews, whilst preserving the rights of the Mohammedan inhabitants. Although it is only small, Palestine consists of three north-south strips. The first is a coastal strip of considerable fertility enjoying a good Mediterranean climate, in which there is a large production of the famous Jaffa oranges; here are the ports of Jaffa, an open roadstead, and the port of Haifa, farther north, which has recently been very much improved and which is becoming a centre of heavy industry.

Near Jaffa the Jews have built the remarkable town of Tel Aviv, rapidly developing a great variety of manufacturing industries. The second strip, running north to south, is the hill country, parallel to the first. In the north of this region lies the famous old village of Nazareth, whilst in the south, at a height of 3,000 feet, is Jerusalem. To a considerable extent it is an upland tract of bare limestone hills or rounded chalk hills on which sheep and goats find pasturage and where with difficulty olive trees are established in the more fertile valleys. Then the third strip is that remarkable valley, occupied by the river Jordan, the Sea of Galilee, and the Dead Sea, the latter with its surface no less than 1,292 feet below sea-level. In this curious depression naturally the air pressure is extremely high and the temperatures are warm so that frost is entirely unknown in the winter. Being cut off from the westerly rain-bearing winds makes it very dry, actually a desert tract, but water being available from the Jordan, irrigation is possible except tracts in those where the ground is impregnated with salt. Of recent years the working of salt near the Dead Sea has become an important industry, whilst power works on the Jordan are now supplying much of Palestine with electric light. Beyond the Jordan is a fourth strip which, actually, is outside Palestine and constitutes the plateau and the margin of the great Arabian desert, which is *Trans-Jordania*. Trans-Jordania is under the same administration as Palestine, but it is not part of the home of the Jews. It is inhabited in the main by Arabs, either settled or nomadic, who are at the same time Mohammedans.

IRAQ. This region was surrendered to the Allies under the Treaties of Sèvres and Lausanne, and was placed by mandate under British control. This mandate has been carried out by the setting up of an Arab government under an Arab ruler, who had to be, and was, accepted by an elected native assembly. Thus King Faisal became the first King of Iraq. In 1927 a treaty was signed between Great Britain and Iraq whereby the independence of Iraq was recognised, and in 1932 the Kingdom became a member of the League of Nations and the mandate was terminated. Iraq comprises the land between the two great rivers Tigris and Euphrates (the land which is Mesopotamia properly speaking), a tract between the Tigris and the mountains of Iran on the north, and a large tract of desert to the south of the Euphrates. The seat of government is Baghdad, the importance of whose situation will be apparent from what is said lower down. The territory is almost wholly dependent upon irrigation, and neglect of the works for the purpose—a neglect largely due to the absence of a sufficiently strong government to defend the settled population against the plundering tribes of the desert—led to an even more striking decline than in Syria and Asia Minor. At various periods of history the banks of the Tigris and

Euphrates have been the seats of brilliant civilisations based on agricultural production. If only security could be guaranteed, there can be little doubt that the region between the Tigris and the Euphrates might be made once more as prosperous as in the days of the Caliphs of Baghdad. In the opinion of Sir William Willcocks, late Director-General of Reservoirs, Egypt, the designer of the Aswan dam, expressed in 1903, between 4,000 and 5,000 square miles might be reclaimed with great profit between about 34° N. and the site of ancient Babylon in about 32½° N., this area lying mainly west of the Tigris north of Baghdad, and stretching from the Tigris to the Euphrates south of Baghdad, but including also about 650 square miles east of the Tigris to the south of Baghdad. In 1909 Sir William was entrusted by the Turkish government with reclamation works on the Euphrates, and on October 27, 1913, a pair of dams constructed under his direction in about 32° N., for the purpose of regulating the flow of that river in the Hindie or Hindiya branch, restored the Hilla branch abandoned some fifty years previously. From this latter branch, which passes the ruin of Babylon and the modern town of Hilla, it is expected that it will be possible to feed once more the canals towards the Tigris. A lock in the Hindie dam allows of navigation above. What has been done, however, is but a small fraction of what might be done, for it has been estimated that the area once irrigated reached 10,000 square miles. The land reclaimed is available not merely for cereals, pulses, clovers, and such winter crops, but also for cotton, sugar-cane, maize, and the other more valuable summer crops of Egypt. The banks of the rivers in lower Mesopotamia are lined with millions of date-palms. Dates not only form a cheap food of the people, but afford the leading agricultural export of the country. Ocean-going steamers ascend to Basra on the Shat-el-Arab, river steamers to Baghdad on the Tigris, an old focus of traffic both for the north and north-west, as well as the north-east (central Persia), on the one hand, and the Persian Gulf on the other hand. The vessels that ascend so far have a maximum capacity of about 500 tons, and take from four or five to six or seven days, according to the state of the river, to ascend from the mouth. Smaller boats reach the still important town of Mosul, opposite the site of the ancient Nineveh, and much produce is brought down even from the neighbourhood of Diarbekr on timber rafts supported by inflated skins, the materials of which are sold at Baghdad. Access to Basra was formerly hindered by a bar at the mouth of the Shat-el-Arab, but this was dredged during the War so as to allow of large vessels reaching the port, which was then provided by the British with a wharf well equipped with handling apparatus. On the Euphrates, navigation is much obstructed. Formerly Birejik, in about latitude 37°, was considered the upper limit; now the river is not

considered navigable above Rakka to the south of 36°, and it is not actually navigated beyond Hit, in about $33\frac{1}{2}$° N.

The railways of Iraq grew piecemeal on standard, metre, and smaller gauges but have now been unified on a metre gauge. The direct line from Basra to Baghdad extends to Kirkuk, but is not yet linked to Mosul or to the 'Baghdad Railway.'

The discovery of rich oilfields near the Iranian border in 1927 was of enormous importance because, amongst other benefits, cheap fuel will be available to irrigation work. A twin pipe-line was constructed across the desert to Tripoli and Haifa on the Mediterranean and production began in earnest in 1935.

ARABIA is made up mainly of desert tablelands upwards of 3,000 feet in height, with the loftiest edge on the south-west, overlooking the Red Sea, and the whole sloping towards the lowlands of Mesopotamia and the Persian Gulf. The only parts that have even a fair supply of rain are the mountainous tracts in the south-west (Yemen) and the south-east (Oman). Yemen, the Arabia Felix of the ancients, has mountains rising to upwards of 10,000 feet in height, and has an ideal climate for coffee-culture (see p. 188). Cultivation, however, has declined either through desiccation or the washing away of the soil. The oases in the interior are the home of the Arab race in its purity, the typical region of the fleet desert horse, the camel, and the date-palm. Politically, Arabia is divided. The peninsula of Sinai belongs to Egypt; the remainder of the west coast includes the kingdom of the Hejaz in the middle and the imâmate of Yemen further south. The interior oases of Nejd, capital Riyadh, are subject to an Emir, who now extends his sway over the coast-strip of El Haza, on the Persian Gulf, extending to the bay situated to the south of the Bahrein Islands. The remainder of the east coast forms the sultanate of Oman. Aden, on the south coast, about 120 miles from the Strait of Bab-el-Mandeb, has belonged to the British since 1839.[1] Possessing an admirable natural harbour, it has at different periods been a great *entrepôt* in the trade between Asia, Africa, and Europe, and since the opening of the Suez Canal its importance in this respect has greatly increased. Its strategic importance is also great. The site it occupies is nevertheless so sterile that all provisions and firewood have to be imported, and water is largely derived from the condensation of steam from sea-water. In Yemen the most important town is Sanā, which lies at the height of about 7,500 feet in the interior; its port is Hodeida. The port of Mocha, further south, gives name to the coffee of Yemen. In the Hejaz the chief town is Mecca, to which, as well as to its port, Jidda, the Mohammedan pilgrimages give a great deal of mercantile importance. It was to facilitate those pilgrimages

[1] Attempts on Aden were made by the Portuguese in the early days of their Eastern trade, first in 1506, but they were not successful.

that the railway which now connects with the Baghdad Railway at Muslamiye to the north of Aleppo was constructed. The Sultan of Oman—or, as he is known from his capital, the Sultan of Maskat (Muscat)—is pledged by a treaty with the British, concluded in 1892, not to cede any part of his territory without British consent. Since the early part of the nineteenth century both sides of the Persian Gulf have been policed by the British fleet, and a British company has laid the only buoys which mark practicable channels and safe anchorages.

The small territory round the inlet of Koweit, or Koait, which forms an excellent natural harbour, is subject to an Arab sheikh under British protection. This harbour, also known as Grane or Korein, has frequently attracted attention as the proposed terminus of several projected railways from the Mediterranean to the Persian Gulf previous to the improvement of Basra as a port.

IRAN

Iran or Persia [1] is largely made up of tablelands more than 3,500 feet in height, and in the east these are in a large measure desert, largely owing to the encircling mountain barriers. In the west a large part is above 5,000 feet. In the east, on the other hand, it sinks in the district of Sistán or Seistan, in which the Helmand ends, to an altitude below 2,000 feet. Mountains in the west and north promote a large precipitation, which, as it takes place mainly in winter, is largely in the form of snow. The water thus becomes available in spring, on which account, according to the estimate of St. John, the desert area of Persia is reduced from nine-tenths to one-half. In any case the precipitation, even where insufficient by itself for cultivation, as it mostly is, at least feeds numerous streams that can be used for irrigation, or supplies moisture which can be drawn from the foot of the mountains by tunnelled canals (kanats or karizes). The temperatures are high enough to allow of the cultivation of wheat up to 9,000 feet, of the grape-vine up to 7,500 feet, and rice up to 4,000 feet. There are numerous date-palms round Bam at the height of about 3,500. Rice is naturally grown to a large extent in the swampy plains, partly below sea-level, bordering the Caspian, and here silkworms, which yielded a valuable product in the Middle Ages and even later, are still reared. Sistán, the eastern half of which belongs to Afghanistan, is imperfectly irrigated by water drawn from the Helmand. Formerly this district was much more productive, but it has lain waste to a large extent since Timur (Tamerlane) in the latter part of the fourteenth century destroyed a great irrigation dam across that river. There can be little doubt,

[1] The government issued a request that henceforth their country should be known as Iran.

however, that its productiveness might be restored by a strong government with sufficient resources.

The means of communication are imperfect, but have been greatly improved in certain places within the last few years. From whatever direction the interior is reached from the sea, a difficult ascent has to be made through the mountains bordering the Iranian tableland. The Indian railway system from the Indus plains through Quetta reaches Duzdap within the Iranian border, but that is separated from the important western region of Iran by hundreds of miles of arid steppes. The road inwards from Bushire is an extremely difficult mule-caravan road, and has to a large extent been abandoned in favour of more modern routes. Even from Tehran, the capital, to Tabriz, the chief city in the north-west, goods had till recently to be carried the greater part of the way on pack animals, though this latter city is now reached from the north-west by rail (opened 1916). A good road has since 1879 led north-westwards as far as Kazvin, and since 1899 a good road constructed by a Russian company has led thence down to Resht on the Caspian littoral behind the port of Enzeli. Since 1892 another road has led from Meshed, the chief town in the north-east (Khurasan), a great resort of pilgrims, to the Persian frontier, where it joins the road from the Trans-Caspian town of Ashkabad. Another road leads south from Tehran to Kum. From Baghdad there is a railway to the Iranian frontier at Khanigin and then a good motor road to Tehran. With these exceptions, few Persian roads are capable of being continuously used by wheeled vehicles, although this is possible during dry weather in the plains, and there are now motor-bus and lorry services.

In 1913 a British company received a concession for a line from Mohammera by Shuster and Dizful to Khurramabad, ultimately to be continued to Isfahan, and the Caspian. This long-projected north-south railway is now, however, being constructed by German and American firms from Bandar Shapur (a new port on the Persian Gulf) direct to Hamadan and Tehran, which will be reached also by a line from Bandar Gaz on the Caspian Sea. Motor services now connect Tehran with all towns accessible by modern road or wheeled traffic.

The rich oil-fields of Maidan-i-Sulaiman worked by the Anglo-Iranian (formerly Anglo-Persian) Oil Company, Limited, are linked by pipe-line with the refinery on the shores of the Gulf (on the island of Abadan) and naturally this co-operation has strengthened the British influence in southern Iran.

By far the most valuable export is petroleum—nearly three-quarters of the whole by value. Other exports include carpets, opium, raw cotton, fruits, skins, gums (including gum tragacanth), various drugs and dyes, coral (chiefly from Khurasan), turquoises (from Nishapur), raw silk, horses, for which Persia has been famous

for centuries, &c. The principal imports are cottons, sugar, tea, and manufactured metals. Of late years Russian trade has been growing in northern Persia (the most populous part of the country) at the expense of the British. This has been due to various causes, of which the chief are the shorter distances from the Caspian ports and from Ashkabad to the interior. The Russians run regular air services to Tehran and even to the Gulf coast.

AFGHANISTAN resembles Persia in surface, climate, and products, and is, like it, cultivated where irrigation can be practised, in the vicinity of the mountains ; barren or nearly barren elsewhere. The richest valleys are in the north—those of the Kabul River and the Heri Rud. On the former river stands Kabul, the capital, which has been connected with Peshāwar by a motor road through the Khyber Pass since the temporary occupation of the town by the British in 1879. On the Heri Rud stands Herat, the centre of a well-irrigated and fertile valley about 120 miles in length by about twelve miles in width. Except on the Peshāwar-Kabul road and one from Kabul to Kandahar goods are carried on beasts of burden, chiefly camels, through close and craggy defiles and narrow stony valleys, among bare mountains, or over waste plains. Formerly traders on this route had constantly to defend themselves against robbers, but in the vicinity of the British frontier more peaceful and secure methods of carrying on trade have been established. A British escort accompanies the traders through the mountains to the Afghan frontier, and there hands over the caravan to an escort of Afghans. The development of motor transport is rendering this unnecessary. The trade with India, however, is very limited. At one time there was a considerable trade through Afghanistan between India and central Asia. It passed to a large extent across the Bamian Pass (12,000 feet), between the Hindu Kush Range and the Koh-i-baba west of Kabul, a route which at various dates in the Middle Ages was much used for valuable commodities. The small trade that India still carries on with Afghanistan consists chiefly in the import of wool and dried fruits in exchange for cottons, tea, and sugar.

TOWNS OF THE NEAR EAST

Syria (1929).		*Iraq.*	
Damascus	194,000	Baghdad (region)	359,000
Aleppo	177,000	*Iran.*	
Beirut	135,000	Tehran	360,000
		Tabriz	219,000
Palestine (1935).		Mestred	139,000
Jerusalem	105,000	Shiraz	119,000
Tel-Aviv	135,000	Isfahan	100,000
Haifa	80,000	*Afghanistan.*	
Jaffa	65,000	Kabul	80,000

THE MONSOON COUNTRIES AND THEIR DEPENDENCIES

INDIA

There is no part of the world better marked off by nature as a region by itself than India, exclusive of Burma. It is a region, indeed, full of contrast, in physical features and in climate, and one that has never been, strictly speaking, under one rule ; but the features that divide it as a whole from surrounding regions are too clear to be overlooked. On the north it is bounded by the Himalayas, the loftiest mountains in the world ; on the west, as we have already seen, it is bounded by mountains and deserts ; and on the east and north-east it is not only bounded by mountains, but lofty mountain chains and deep valleys follow one another for hundreds of miles. Elsewhere the boundary is the sea.

Within the mountains a vast plain, from about 150 to more than 300 miles in width, sweeps round from the delta of the Ganges and Brahmaputra in the east to that of the Indus in the west. The peninsular portion to the south of these plains is mainly made up of tablelands varying in elevation for the most part from about 1,500 to 2,500 feet. On the west this tableland advances close up to the sea, and is bounded by the mountains called the Western Ghāts—in reality the lofty edge of the plateau ; but on the east its boundary is generally at a greater distance from the coast and is more winding. The name of Eastern Ghāts is sometimes used generally for the whole of this boundary, sometimes restricted to its southern portion.

The dense population is for the most part confined to the plains, but is prevented by climatic and other circumstances from extending over their whole area.

Structurally, the plateau of Peninsular India is built up of a great mass of ancient metamorphic rocks. Over 200,000 square miles of the north-west these are covered by great sheets, almost horizontal, of basaltic lava (the so-called ' Deccan Traps ') which furnish a dark, almost black, soil well suited to cotton. Old basins in the surface of the plateau are filled with sedimentary rocks, including the main coal-bearing strata. The great plain of the north and the

coastal plains of east and west are built up of alluvium and other recent deposits, furnishing deep rich agricultural soils. The mountain wall of the north is of Tertiary or Alpine age.

The **mineral wealth** of India is tolerably abundant. As shown in the map on p. 583, both coal and iron ore are widely distributed, but of the coal-fields the most productive lies in the west of Bengal and the east of Bihar. The most productive parts of the chief coal-field lie in the Damodar valley belonging to the basin of the Hooghly, where about nine-tenths of the coal raised in India is produced. Rāniganj, about 120 miles north-west of Calcutta, was long the principal coal-mining centre, but the production of this field has at last been eclipsed by that of the Jherria field, about 40 or 50 miles further west. Still further west is Daltonganj. On the tableland three important coal-fields are now connected with the Indian railway system. One is that at Umarīa in Central India, east of Jubbulpore; another, that of Warorā, in the Wardhā valley of the Central Provinces; and the third that of Singareni, in Hyderābād.

The total production of India averages about 20 million tons; the production of the Central Provinces and Hyderābād representing rather under one million tons in each case. These coals all belong to the Permo-Carboniferous or Gondwana deposits and are good quality bituminous coals. Lignites and brown coals, of little importance, occur in Assam and the Punjab.

Iron ore is widely scattered over the mountainous and hilly parts of the country, and with the profuse employment of charcoal for smelting, the natives made iron of excellent quality. But this expensive mode of working has been almost superseded by the import of European iron and iron wares, followed by the development of the European production methods in India. Of the earlier attempts to introduce the modern processes of smelting in India the most successful was that of the Bengal Iron and Steel Co. near Barākar in the north of the Rāniganj coal-field, where ores are obtainable, and a suitable coal for smelting is procured at Karharbāri or Giridhi. For many years little progress was made, but in the early years of the present century the company began to supplement the local clay ironstone ores with magnetites obtained in Chota Nagpur, and since then its success has been decided. Later, in 1911, however, a more ambitious programme was initiated by the Tata Iron and Steel Co., which obtained leases over the rich massive ore bodies of the northern part of the Mayurbhanj state of Orissa, and the Raipur district of the Central Provinces. Later, even more important deposits of iron ore were discovered in the British district of Singhbhūm, to the south-west, and the company obtained a concession in which, it is said, a ravine cutting across the ore range shows a continuous thickness of 700 feet of hematite, containing more than 60 per cent. of iron. Even before this last discovery,

blast-furnaces were started in 1911 and steel first produced in 1933 from modern rolling mills. The site chosen for the new industry was Jamshedpur where some formerly exploited ores were available. Here the Calcutta-Bombay railway (*via* Nagpur) has a branch to Asansol and the coal-fields (about a hundred miles away), whilst the main ore-fields lie 45 miles to the south-west. Limestone and manganese are within easy reach. Thus, a village in the barren scrub has grown into a town of over 100,000 inhabitants. Jamshedpur is now a great industrial centre, producing not only a great variety of articles in iron and steel, including mill and electrical machinery, but also heavy chemicals, fertilisers, and explosives. The large demand for tin-plate by the Burmah and Anglo-Persian Oil Companies led to the erection of plant in Bengal capable of manufacturing about 30,000 tons of tin-plate annually. The company's output approaches a million tons of pig-iron a year and three-quarters of a million tons of steel and supplies three-quarters of India's requirements. The Tata Company had a monopoly of steel until 1934–35 when works were erected at Belur, north of Calcutta.

Until the separation of Burma's production from that of India **mineral oil** ranked second in value amongst the mineral products, but over 80 per cent. of the output came from Burma. The Indian production is from the Khaur field in the Punjab with refineries at Rawalpindi and from several small fields in Assam, notably at Digboi. India is, next to Russia, the largest producer of **manganese ore** in the world. The ores are widely distributed in the old rocks of the plateau, many are very rich, and many areas have been worked. The deposits in the Central Provinces began to yield only in 1901, but later yielded three-quarters of the total production. In 1932 Sandur in Madras became the biggest producer.

Silver, though formerly the standard metal of the country, is not abundant, and the output formerly credited to India was almost entirely from the Bawdwin Mines of Burma; the same is true of lead. **Gold** is important now only in the Kolar field of Mysore, the production ranging between 300 and 400 thousand ounces of fine gold. Copper is found in the Singhbhum district of Bihar though mining and production have been irregular, and the small deposits of the Himalayas are not now exploited. **Chromite** is found in many parts of India and is worked especially in Singhbhum, Mysore, and Baluchistan. **Mica,** valuable as an insulator, is a characteristic Indian mineral and is obtained from the old rocks in many parts of the plateau, the huge sheets from the Nellore district of Madras being specially famous.

Salt in India, as in all vegetarian countries, is a necessity of life more urgently required than in countries in which more animal food is consumed. It is obtained by evaporation all along the coasts

(especially of Bombay and Madras) and is quarried in the form of rock-salt in the Salt Hills of the Punjab. The duty on it is an important source of revenue. The extraction of saltpetre (nitrate of potash) in the Punjab, United Provinces, and Bihar has declined from various causes, but chiefly in consequence of the competition of Chilean nitrate and latterly of artificial fertilisers. In India it is a natural product formed in alluvial soils from animal and vegetable refuse in a climate with alternating wet and dry seasons. In the dry season the efflorescence was collected from the soil and purified.

As regards **climate**, the Indian year is popularly divided into three seasons—the hot, the rainy, and the cool; but these names are appropriate only in the north-east and to some extent along the western coast. In the south, where the latitudes are low, there is no really cool season, and in the north-west, though the rains occur at the same period as in the Ganges valley, they are small in amount. The hot season is from March to May inclusive, the period that embraces the change of the monsoons from north-east to south-west, but before the 'bursting' of the south-west monsoon—that is, before the southerly winds begin to be accompanied by rain. During this period the highest temperature is in the heart of the Deccan. The rainy season lasts from June to October inclusive, and during this period the western slopes of the Western Ghāts, the hills of Assam, the slopes of the eastern Himalayas, and even the plains of the Ganges delta, are deluged with rain, and the greater part of the north-east receives a fairly abundant rainfall. The part of the Deccan immediately behind the Western Ghāts, however, has a very moderate and precarious rainfall, and so too have the plains in the north-west. A large part of the Indus valley is almost rainless. Where the rains are abundant the temperature is mitigated, but in the arid region just referred to this is naturally the hottest period of the year. The cool season, or the season of the north-east monsoon, lasts from November to February inclusive. The earlier part of this period is classed more scientifically as the period of the retreating monsoon—giving thus a fourth season. The storms of October, November, and December bring rain to the south-eastern plains, the moisture brought by the winds from the Bay of Bengal being condensed in consequence of the obstruction presented by the Eastern Ghāts and the mountains of Travancore. But the amount of rain that falls on those plains is only one-third or one-fourth of that which falls on the best-watered plains in the north during the rainy season. The season is naturally coolest in the north-west, where the highest latitudes are reached, and even on the plains there are genuine winter temperatures by comparison with the extreme heat of summer. In this region, in the latter half of the cool season (January to about March) there is a recurrence of rains, believed

to be brought by cyclonic disturbances originating in the Mediterranean.

The amount of rain that falls varies in India, as everywhere else, from year to year ; but it is an important fact that, whereas in a country like England the variations in the rainfall may increase or diminish the abundance of a crop, in a large part of India the variation may be such that in one year there is an ample supply for a good crop, in another a rainfall wholly inadequate to produce any crop at all. It is this area of uncertain rainfall that is liable to be visited by famines and hence irrigation has to be practised not only in those parts of the country in which there is always a deficiency of rain, but also in those in which it is doubtful whether the rain may be sufficient or not. Even where the amount of the rain is sufficient for the requirements of the crops irrigation is in many cases demanded by the mode in which the rain falls. The north-east monsoon, on which the southern plains (Madras) chiefly depend for rain, is remarkable for the fact that rain falls for the most part in bursts, and generally at night. 'I have known,' says Sir Arthur Cotton, 'a fall of ten inches in one night, and twelve in another a fortnight after '—half a year's supply in two showers. Accordingly, Madras and the Deccan generally are dotted with thousands of tanks or reservoirs for irrigation-water, except in those portions, chiefly lying in the north-west of the Deccan, which are covered with the black soil described on p. 573.

These tanks usually contain little, if any, more than one year's supply, and hence are altogether inadequate to meet the uncertainties arising from recurring years of drought. In certain places, however, there is a natural storage of water underground that can always be made available by means of moderately deep wells. The whole of the plain along the base of the Himalayas has constant supplies of fresh water at a greater or less depth, and the middle portion of it has these supplies near enough to the surface to be easily reached. 'Hence, between Delhi and Benares, the upper stratum of the alluvial plain is riddled like a sieve with water-holes or wells ten to fifty feet in depth.'[1]

The greatest irrigation works are canals led from rivers. In the Indus valley the old canals for irrigation in Sind were merely laid so as to carry off the surplus water, when the melting of Himalayan snows caused a rise of the water in the main stream and its tributaries. These were known as inundation canals and were for long in operation, and, though very useful and profitable in most years, the supply of water by this method is precarious, as the rise of the rivers may be so small as to yield little water or none at all. But works of much greater magnitude have been made in the form

[1] *Statistical Atlas of India.*

of canals, into which is led nearly the whole body of water belonging to a river for a greater or less distance. These are known as perennial canals. On the delta of the Cauvery such canals are said to have been constructed as far back as the fourth century of the Christian era, but under British rule such works have been extended to all the other deltas of the east coast and many parts of the plains of northern India. About 1885 the total length of canals under government supervision was above 28,000 miles, and the area irrigated by them was equal to that of Belgium (11,400 square miles). In 1919–20 the area irrigated had been increased to about 28,000 square miles—almost the area of Scotland. In April 1914 the Upper Swat Canal, which involved the piercing of a canal through the Malakand Hills to establish a colony of nearly 600 square miles in extent in the northern part of the Peshawar district, was opened. In 1922 legislative sanction was given to a project (completed in 1933) for the construction of a dam (Lloyd Barrage) across the Indus at Sukkur, which has made it possible to place some 5⅓ million acres under perennial irrigation, of special importance for cotton cultivation. It is estimated that the execution of this scheme has rendered about 400,000 acres (625 square miles) available for the production of long-staple cotton similar to that of Egypt. With the view of extending irrigation into the arid and frequently useless desert tracts in Bahawalpur and districts in the south-west of the Punjab, the Sutlej Valley Canals were commenced and, like the Sarda works of the United Provinces, have been finished within the last decade. There are numerous other works also actually in progress. It has been said, with some truth, that India adds a new Egypt to her area every year. In 1931–32 the total area of British India irrigated was over 77,760 square miles. There are no irrigation canals on the lower Ganges, where they are not required ; none on the area between the Ganges and the Gorga, for the reason stated in the previous paragraph; and few on the upper parts of the rivers of the Deccan, where the depth of the river valleys below the surrounding country does not generally admit of this mode of irrigation. These canals serve little for navigation, indeed one of the few canals in India used primarily for this purpose is the Buckingham Canal, which, being a salt-water canal, is not available for irrigation, but forms an inland waterway from the mouth of the Godavari to Madras, and some distance further south.

In connection with irrigation it may be pointed out that the structure of the country, combined with the character of the climate, affords in many places, as in the Himalayas and the Western Ghāts, the opportunity of forming immense tanks or reservoirs by damming the mouths of narrow valleys, providing at once the means for irrigation and the development of water-power. In one case the headwaters of the Periyar in the native state of Travancore have been dammed and the lake thus formed drained through a tunnel

to the east side of the Cardamom Hills, so as to irrigate arid plains in Madras.[1]

As might be inferred from the table of exports, India is almost exclusively an agricultural country. At the census of 1881 the number of persons directly supported by agriculture and the rearing of live-stock made up 72 per cent. of the male inhabitants engaged in some specified occupation. There has since been little change, for the percentage in 1911 was 71, 1921 over 73 and 1931, 68. The holdings are mostly small, on an average about five acres each. In Bengal, the Famine Commissioners in 1880 reported that two-thirds of the peasant holdings were only about half that size. The land is one of the chief sources of the revenue of British India.[2] The land-tax is the first liability on the land. In some provinces it is generally paid by the actual cultivators (the rāyats or ryots), who are small proprietors; in other cases, by larger landowners from whom the cultivators rent their holdings.

For the most part two crops are reaped in the year, but not usually from the same land. In the area of the summer monsoon rains, one crop is generally sown in the early weeks of the monsoon (June and July), and reaped in October and November; the other is sown at the end of the monsoon and reaped from January to March. The latter, accordingly, is the winter crop; and as the winter throughout the north-western half of India is at least as cold as the summer of northern Europe, wheat, barley, and linseed are among the winter crops of the region wherever the duration of cool weather is long enough to ripen them. Although in recent years the cultivation of wheat has extended southwards to the southern limits of Bombay Presidency and Hyderābad, the chief region of production of this cereal is in the Punjab and the United Provinces—that is, far in the north.

Although wheat, largely in consequence of the extension of irrigation in the north-west, is in years of plenty an export crop, it has become one of the staple food crops for home consumption in the north-west. Crops that may be described as universal in India are millets, pulses, and oil-seeds; and except on the best watered plains, suitable for rice-growing, and in parts of northern India where a stronger grain is required, millets and pulses, along with garden produce, form the bulk of the food of the agricultural population. The most extensively grown unirrigated crop in India is the great millet, here known as *jowār*; the millet next in importance

[1] Of the schemes of the kind formed primarily with a view to power development was that for the damming of the headwaters of the Koyna river to the south of Bombay, so as to render electrical energy available to the amount of 300,000 horse-power.

[2] In 1930–31, 16 per cent. of the total revenue was derived from the land, against 40 per cent. from customs, 29 per cent. from railways, and 14 per cent. from income tax.

is the smaller spiked millet, or *bajra* ; and the principal pulse is, as in Spain, the chick-pea or *gram.* In all, fourteen cereals are cultivated, and nine different kinds of pulse. The oil-seeds most extensively grown are sesame, ground-nuts, linseed, castor-oil, mustard, and different kinds of rape. The largest export under this head is that of linseed but ground-nuts with their nitrogen-fixing root-bacteria have enabled poor tracts of sandy soil previously useless to be brought under cultivation.

Opium cultivation has now almost disappeared but had its chief seats in the valley of the Ganges round Patna and Benares, and in Central India in the region corresponding to the old kingdom of Malwa. Cotton is mainly grown on the southern tableland, and above all in that series of fertile plains opened up by the railway that ascends the Tāpti valley—that is, the plains of Khandesh in Bombay, and of northern Berār, both lying on both sides of the Tāpti, and those of the Wardhā in the west of the Central Provinces. It is likewise largely grown on many other parts of the tableland, but the finest cotton of India—long-stapled American varieties—is grown on irrigated land in the Punjab. Regarding rice, jute, tea, lac, coffee, and indigo, nothing need be added to what will be found under these heads elsewhere in the book ; and among the vegetable and animal products not mentioned in the table, reference may also be made to cinchona, silk, and pepper, all of which are likewise treated separately. The import tables show that India is largely dependent on other countries, not only Java, for supplies of sugar. Sugar-cane is, however, largely cultivated in the northern plains, and sugar is also derived from palms, chiefly in southern India, and the native production is equal to at least 95 per cent. of the total consumption. In recent years there has been a remarkable increase in the production of sugar in India. With respect to the export of hides and skins, it should be explained that cattle are the chief beasts of draught and burden in the greater part of India, but that in the wet plains of eastern Bengal they give place to buffaloes. The great **cattle-rearing region** of India is a belt extending from Cutch, through eastern Rajputana and the Punjab, to Kashmir, a belt in which the rainfall is not so excessive as to wash away all the saline constituents which are found to be so essential to the health of cattle.

Industries. Not only in metal-working, but also in various other branches of manufacture, the Indian handicrafts have suffered greatly from European competition, as the table of imports on p. 586 clearly shows. Cheap Manchester cottons and, more recently, the products of the native cotton factories of Bombay and the influx of Japanese goods, have told heavily on the old hand-spinning and weaving. Even the fine muslins of Dacca (Bengal) and Madras, for which India has long been celebrated, have almost become a

thing of the past. Faetories and industries are spreading, not only in eotton and jute but in other manufaetures, but the exploitation of eheap labour has been earefully eontrolled. Under the present Indian Faetory Aet, whieh was entirely revised in 1922 and 1923, children, under whieh designation are included all those under fifteen, eannot be employed in faetories under the age of twelve (the meaning of the term faetory was considerably extended), or for more than six hours in any one day. No person is to be employed in a faetory for more than sixty hours in any one week or eleven hours in one day. A rest day of twenty-four hours is to be given normally every seven days, and no one is to be allowed to work more than ten eonseeutive days without such rest. Rest periods of at least one hour must reeur at intervals of not more than six hours.

In the making of various articles of luxury and art, however, Indian artisans still exeel. Silk faetories worked by steam have been started at Bombay, but the making of richly figured silks by hand is still earried on to a large extent in Murshīdābād (Bengal), Benares (United Provinees), Ahmādābad (Gujarat), Triehinopoli (southern Madras), and other old towns of note. Cashmere shawls are still made both in Kashmir and the Punjab (Amritsar, Ludhiana, and elsewhere). Indian carpets and rugs are artieles of export, and so also are a variety of articles skilfully wrought in ivory, gold and silver, eopper and brass, but the quality of many of these artieles has been greatly injured through the want of taste in European purehasers. The cotton and silk factories and the jute factories of Bengal are an illustration of the growth of the modern spirit of commeree in India, whieh is shown also in the rapid inerease in the number of native joint-stoek companies. The eotton mills are mainly in native hands, but the jute factories are mostly the property of British capitalists. It may here be added that in the Bombay factories work ean be earried on all the year round without artifieial light, the short hours of daylight in winter not being present as in higher latitudes.

In reeent years there has been a rapid growth of sugar faetories—from 30 in 1931 to 130 in 1934.

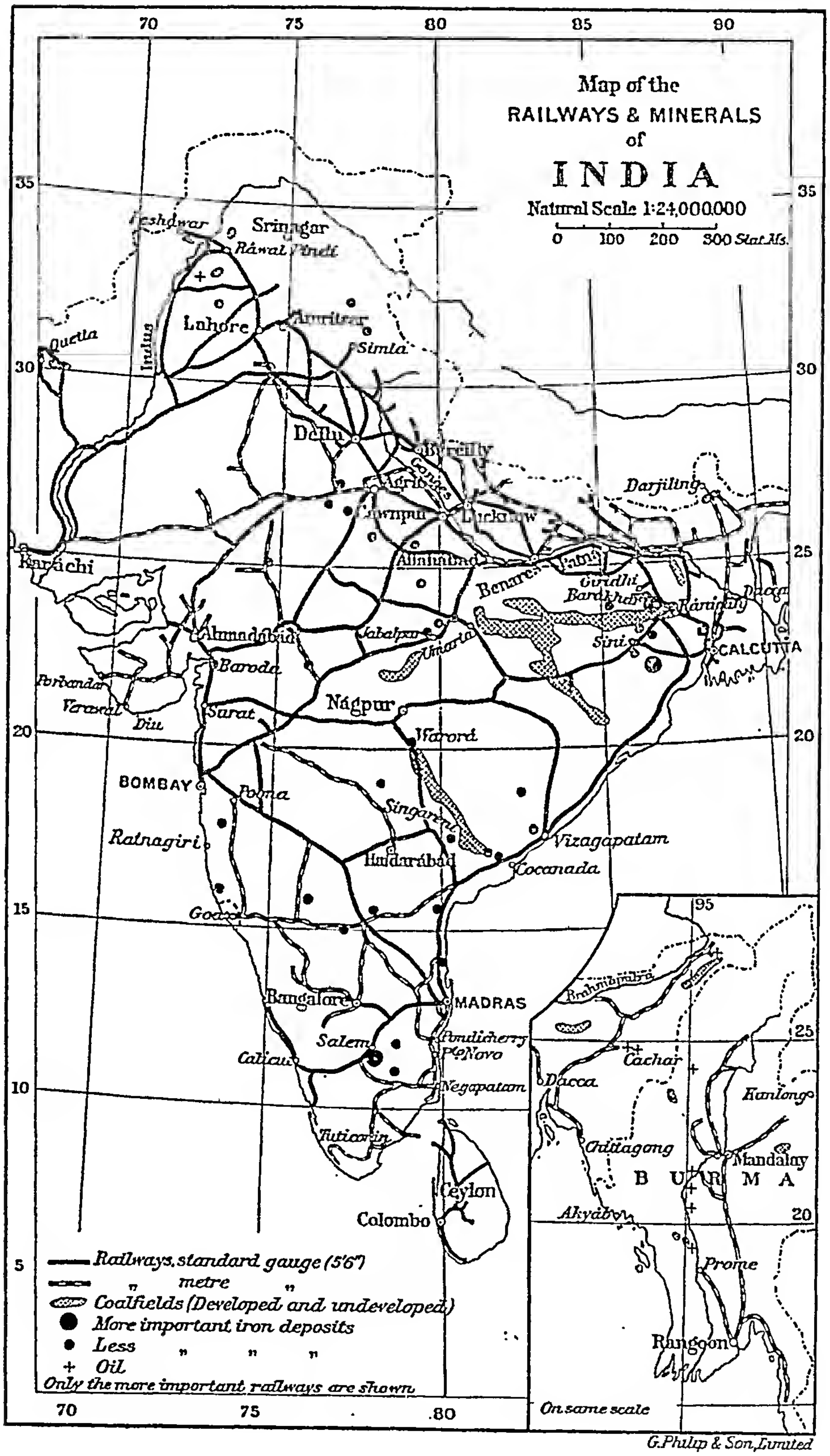
Communications. In the plains eommunieation is naturally easy. The seareity of stone in the great plains has been an obstacle to the making of good metalled roads and often the only local material available are the small coneretionary nodules or 'Kankar' of the older alluvium. In the future concrete will probably supply the solution to this age-old problem. The rivers of the Ganges basin furnish good waterways, or did until the coming of the railways and the utilisation of their water for the more pressing needs of irrigation. The deerease in importanee of river transport (except in the delta) has led to the deeay of many of the

old river ports unless they also serve the newer purpose of railway centres. The flatness of the surface has greatly facilitated the construction of railways, but one must bear in mind that this very flatness creates difficulties in protecting the land adjoining the railway embankments in the rainy seasons. The number of rivers to be crossed necessitates great expense in bridging, and in the wetter regions the vigour and rapid growth of vegetation and in the drier regions the dust storms, add to the expense of maintenance. Though the map on p. 583 is on too small a scale to be complete, it shows the main features of the Indian railway system, and enables one to understand the fact that in the middle of the Ganges basin railways have almost superseded water carriage, even in the case of heavy goods. In the delta of the Ganges and Brahmaputra, which furnishes an unsurpassed system of water communications, the network of railways is not so close, and the Brahmaputra still forms the main highway to the north-east. The Indus, owing to frequent shiftings of its bed and accumulations of sand, is not so easy to navigate, and steamer traffic on it has been abandoned.

One disadvantage of the difference of gauge shown on the railway map, the resulting prevention of intercommunication between lines on different gauges without break of bulk, is obvious. But it will be observed that this drawback is at least mitigated in India by the fact that there are interconnected lines on the broad gauge from Peshawar in the north to Calicut in the south, and that there are extensive interconnected systems on the metre gauge, both in the north and the south. But it is also to be noted that narrow-gauge railways are necessarily less efficient than those on a broad gauge, and that, it would seem, not only because of the smaller capacity of the wagons, but also because the speed on them is less. According to Sir Charles Metcalfe the speed attainable on a $3\frac{1}{2}$ ft. gauge is only half that on a 4 ft. $8\frac{1}{2}$ in. gauge.[1] On the other hand, narrow-gauge railways are much cheaper to construct, especially in hilly country, and it is obviously uneconomic to build expensive railways in regions which are never likely to yield traffic enough to utilise their full efficiency. The difficulty of penetrating into the mountains by railway is obvious, but the importance of such lines from the strategic point of view may necessitate their construction.

The broad-gauge railway in the north-west of India which was carried on to Jamrud at the entrance to the Khyber Pass about the beginning of the present century was continued through the pass to the Afghan frontier and opened in 1925. There are also a number

[1] *Geog. Journ.*, vol. xlvii, p. 6. In South Africa, however, which has a very efficient railway system on the 3 ft. 6 in. gauge, speeds of 40 m.p.h. are maintained, thus comparing favourably with the normal maximum of a little over 60 m.p.h. on the 4 ft. $8\frac{1}{2}$ in. gauge.


Map of the
RAILWAYS & MINERALS
of
INDIA
Natural Scale 1:24,000,000
0 100 200 300 Stat. Ms.
Srinagar
Lahore
Simla
Quetta
Indus
Delhi
Karachi
Cawnpur
Lucknow
Allahabad
Benares
Darjiling
Ahmadabad
Jabalpur
Baroda
Porbandar
Diu
Surat
Nagpur
Warora
BOMBAY
Poona
Ratnagiri
Singareni
Haidarabad
Vizagapatam
Cocanada
Goa
Bangalore
MADRAS
Salem
Calicut
Pondicherry
Negapatam
Tuticorin
Ceylon
Colombo
CALCUTTA
Raniganj
Dacca
Cachar
Chittagong
Mandalay
BURMA
Akyab
Prome
Rangoon
Railways, standard gauge (5'6")
" metre "
Coalfields (Developed and undeveloped)
More important iron deposits
Less " " "
Oil
Only the more important railways are shown
On same scale
G. Philip & Son, Limited

of mountain railways on narrower gauges (2 ft. 6 in. and less) than those distinguished on the map.

In the peninsular portion of India the nature of the surface has placed special difficulties in the way of communication between the coast and some of the richer plains or depressions of the tableland in the interior. The rivers in times of flood are too impetuous, at other seasons most of them are too scantily supplied with water to be navigable except near their mouths, and even where they are navigable higher up, their navigation is impeded by rapids occurring where they break through the mountains bordering the plateau. Not only so, but they mostly break through these mountains in gorges too narrow or country too wild to be easily traversed by roads or railways. On looking at a physical map of India one might expect the valley of the Narbadā, continued by that of the Son, a tributary of the Ganges, to form a natural line of communication between the Gulf of Cambay and the valley of the Ganges; but this is prevented by the existence of rugged forest country on the lower part of the Narbadā, and wild country in the upper two-thirds of the valley of the Son. Hence the railway that now passes through the most fertile expanse of the valley of the Narbadā, between the Vindhya Hills on the north and the Sātpura Hills on the south, enters this valley by a diagonal route from Bombay, and leaves it near the head of the valley of the Son, then striking north-eastward to Allahabad. So, too, a series of fertile depressions of the tableland is cut off from the coast by wild and difficult country on the lower part of the Tāpti, and this region is hence reached by a branch of the same railway that proceeds from Bombay to the valley of the Narbadā. A similar depression in the upper basin of the Mahānadi was opened up by rail only in the early part of 1916, with the result that land which had brought a rent of 4*d*. an acre yielded excellent crops of cotton, ground-nuts, and sugar-cane, and a rent of 13*s*. an acre. The railway, completed in 1933, from Raipur to Vizagapatam, in conjunction with the new harbour at Vizagapatam has had similar beneficial results. To gain the surface of the tableland from Bombay, the railway has to cross a pass called the Thāl Ghāt, more than 1,900 feet in height. Communication between Bombay and Madras, across the Deccan, has been effected since 1863 by means of a railway up the Bhor Ghāt, a pass about a hundred feet higher than the former, and much more difficult. The carriage-road up this pass, completed in 1830, itself a remarkable engineering achievement, formed the first good means of communication between Bombay and the interior.

A third railway crosses the Western Ghāts about the middle, serving to connect the Portuguese port of Goa with the fertile district of Dhārwār, and through that with Madras; but south of this there is no other railway across the peninsula till we come to the

remarkable depression known as the Pālghāt Gap. This important physical feature lies immediately to the south of the Nīlgiri Hills, a group of small but high plateaus in the south of the Deccan at the angle where the Western and Eastern Ghāts approach nearest to one another. The highest elevation of the gap is a little more than 1,000 feet above the sea, and the opening which it forms is all the more striking from the fact that it separates mountains rising to nearly 9,000 feet in height both on the north and south. The southern mountains (the Cardamom Hills) extend to the southern extremity of the peninsula, occupying the greater part of the native states of Cochin and Travancore. Through the gap between them and the Deccan runs the railway from Madras to Calicut.

Commerce. It will be observed from the tables given below that one of the striking features of Indian foreign commerce was, until recently, the large excess of imports of bullion and specie. It is obvious that the continuance of a greater or less excess under this head points to the steady accumulation of specie (formerly silver, later chiefly gold) in the country. Another noticeable fact is, that even when the excess of the import of treasure is added to the value of the import of merchandise, the Indian imports are still far below the exports in value. The explanation of this difference is found in the necessity of exporting, either in treasure or in goods, enough not only to balance the imports, but likewise to pay the home charges of the Indian government, pensions, and the cost of carriage of exports. In the last few years the rise in the price of gold, expressed in terms of the Indian rupee, led to an enormous export of treasure though probably only a small part of the accumulated hoards. At the same time this points to an increased confidence in the banking system.

During the War the commerce of India was necessarily greatly affected by the obstacles to communication with the west, and also by the exceptionally great increase during the War and in the year or two following the War in the prices of the raw produce that makes up the bulk of Indian exports. This latter fact is the chief explanation of the increase in the proportion by value of the goods sent to the United Kingdom from an average of 25 per cent. per annum in the period 1909–14 (March 31) to 31 per cent. in the period 1914–19, and to 36 per cent. in the year 1919–20, while the subsequent fall in prices accounts for the decline in the British share to 20 per cent. in 1921–2. Meantime, the principal advance in proportion has been that of Japan, which received in the period 1909–14, 7 per cent., in the year 1919–20, 14 per cent., and in 1921–2 (after a decline to 9 per cent.) 16 per cent. of the value. The decline of Great Britain's share in supplying the imports from 63 per cent. on the average of the years 1909–14 to 56 per cent. in 1914–19, is easily understood. Her lowest percentage was in 1919–20 (51 per cent.). In 1921–2

INDIA[1]

GENERAL IMPORTS, BY SEA, OF PRIVATE MERCHANDISE

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1870–75	'80–86	'86–91	'91–96	'96–01	1901–06	'06–11	'11–14	'24–29	'70–75	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14	'24–29
1. Cotton manufactures	17·07	20·14	21·24	17·55	18·51	23·31	28·16	39·26	52·84	56·5	48·9	45·9	42·4	40·0	39·3	34·8	36·6	23·7
Tissues	*14·41*	*17·40*	*18·68*	*15·71*	*16·66*	*21·58*	*25·89*	*36·51*	*46·82*	*47·7*	*42·4*	*40·4*	*38·0*	*36·0*	*36·4*	*32·0*	*34·0*	*21·1*
Yarns	*2·66*	*2·74*	*2·56*	*1·84*	*1·85*	*1·73*	*2·27*	*2·76*	*6·02*	*8·8*	*6·6*	*5·5*	*4·4*	*4·0*	*2·9*	*2·8*	*2·6*	*2·6*
2. Metals	2·11[2]	3·58	3·64	3·53	3·62	5·67	8·47	11·51	—	6·9	8·8	7·9	8·5	7·8	9·6	10·5	10·7	—
Iron and steel	*0·91*	*1·59*	*1·91*	*1·85*	*2·47*	*3·83*	*5·95*	*8·35*	*12·05*	*3·0*	*3·9*	*4·1*	*4·5*	*5·3*	*6·5*	*7·4*	*7·8*	*6·4*
Copper	—	*1·53*	*1·23*	*1·20*	*0·65*	*1·17*	*1·67*	—	—	—	*3·7*	*2·7*	*2·9*	*1·4*	*2·0*	*2·1*	—	—
3. Sugar	0·52	1·17	1·67	1·69	2·73	4·20	7·14	9·15	12·65	1·7	2·8	3·6	4·1	5·9	7·1	8·8	8·5	5·8
4. Machinery and millwork	0·67	1·02	1·42	1·52	1·84	2·42	3·85	3·91	11·20	2·2	2·5	3·1	3·7	4·0	4·1	4·8	3·7	5·4
5. Railway materials	0·62	1·15	1·47	0·83	1·59	1·01	3·80	4·64	2·91[5]	2·0	2·8	3·2	2·0	3·4	1·7	4·7	4·3	1·5
6. Oil, chiefly mineral	0·07	0·67	1·47	1·76	2·38	2·33	2·31	2·85	7·17	0·2	1·6	3·2	4·2	5·1	3·9	2·9	2·7	3·5
7. Hardware & implements	—	0·59	0·77	0·80	1·02	1·42	2·09	2·33	3·86	—	1·4	1·7	1·9	2·2	2·4	2·6	—	1·8
8. Provisions	—	0·86	1·05	1·07	1·10	1·39	1·85	1·50	—	—	2·1	2·3	2·6	2·4	2·3	2·3	1·4	—
9. Woollens	0·57	0·98	1·16	0·99	1·07	1·47	1·71	2·29	2·91	1·9	2·4	2·5	2·4	2·3	2·5	2·1	2·1	1·5
10. Apparel	0·51	0·65	0·90	0·89	0·92	1·32	1·68	1·08	1·40	1·7	1·6	1·9	2·2	2·0	2·2	2·1	1·0	0·8
11. Silks	0·52	0·99	1·13	1·02	0·87	1·20	1·50	1·96	2·63	1·7	2·4	2·5	2·4	1·9	2·0	1·9	1·8	1·2
Coal and coke	0·54	0·94	1·10	0·75	0·43	0·26	0·43	0·61	—	1·8	2·3	2·4	1·8	0·9	0·4	0·5	0·6	—
Average total value	30·21	41·06	46·20	41·46	46·24	59·32	80·80	107·29	198·81									

EXPORTS,[3] BY SEA, OF PRIVATE MERCHANDISE

Principal Articles.	1870–75	'80–86	'86–91	'91–96	'96–01	1901–06	'06–11	'11–14	'24–29	'70–75	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14	'24–29
1. Grain and pulse	5·15	12·68	12·27	12·69	11·38	19·60	19·98	31·87	33·22	9·6	19·0	17·9	18·9	17·0	20·7	16·9	22·2	12·8
Rice and paddy	*4·65*	*6·82*	*7·05*	*7·69*	*8·56*	*12·02*	*12·83*	*19·60*	*25·13*	*8·7*	*10·2*	*10·3*	*11·7*	*12·8*	*12·7*	*10·8*	*12·5*	*9·8*
Wheat	*0·34*	*5·57*	*4·79*	*4·28*	*2·09*	*6·04*	*5·71*	*9·80*	*4·68*	*0·6*	*8·4*	*7·0*	*6·2*	*3·1*	*6·4*	*4·8*	*6·2*	*1·8*
2. Raw cotton	15·66	11·18	11·16	7·23	6·87	12·31	17·99	21·95	56·27	29·2	16·7	16·3	11·0	10·3	13·0	15·2	14·0	21·4
3. Raw jute	3·30	3·83	5·00	5·25	6·02	8·50	12·70	17·87	22·87	6·1	5·7	7·3	8·1	9·1	9·0	10·7	11·4	8·9
4. Oil-seeds	2·51	6·77	6·87	7·82	6·19	9·49	11·38	16·99	21·48	4·6	10·2	10·0	11·9	9·3	10·0	9·6	10·8	8·4
5. Jute manufactures	0·22	1·04	1·53	2·16	4·04	6·61	11·18	14·92	40·55	0·4	1·6	2·2	3·3	6·1	7·0	9·5	9·5	15·7
6. Hides and skins	2·40	3·64	3·43	3·69	5·83	6·57	8·73	10·28	11·94	4·4	5·5	5·0	5·7	8·7	6·9	7·4	6·5	4·6
7. Tea	1·49	3·12	3·80	4·31	5·57	5·52	7·29	9·16	22·10	2·8	4·7	5·5	6·6	8·4	5·8	6·2	5·8	8·5
8. Opium	11·07	9·51	7·28	5·39	5·05	6·28	6·59	6·16	1·32	20·7	14·2	10·6	8·2	7·6	6·6	5·6	3·9	0·5
9. Cotton twist and yarn	0·15	1·60	3·63	3·68	4·11	6·52	6·32	6·08	1·85[4]	0·3	2·4	5·3	5·6	6·2	6·9	5·3	3·9	0·7[4]
10. Cottons	1·21	1·67	1·96	1·94	0·86	1·13	1·34	1·50	4·55[4]	2·3	2·5	2·9	3·0	1·3	1·2	1·1	1·0	1·8[4]
11. Lac and lac dyes	0·22	0·50	0·39	0·68	0·72	1·57	2·04	1·35	5·35	0·4	0·8	0·6	1·1	1·1	1·7	1·7	0·9	2·1
12. Raw wool	0·82	0·86	1·11	1·10	0·79	0·98	1·61	1·72	3·37	1·5	1·3	1·6	1·7	1·2	1·0	1·4	1·1	1·3
14. Coffee	1·15	1·16	1·13	1·28	0·98	0·98	0·79	0·99	1·40	2·2	1·7	1·7	1·9	1·5	1·0	0·7	0·6	0·5
28. Indigo	3·10	3·35	2·63	2·59	1·96	0·74	0·34	0·18	—	5·7	5·0	3·8	4·0	3·0	0·8	0·3	0·1	—
Average total value	53·57	66·64	68·50	65·90	66·61	94·54	118·27	157·19	260·60									

[1] Year ends March 31. [2] Including 'hardware and implements.' [3] General exports to 1896, special exports from 1896–97 onwards. [4] 1925–29. [5] Railway plant and rolling stock, 1925–29.

INDIA

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'71–76	'81–86	'86–91	'91–96	'96–01	'01–06	'07–11	'11–14	'25–29
1. United Kingdom	83·6	80·8	77·6	70·8	67·7	65·6	63·3	63·3	47·5
2. Germany	0·1	0·2	0·9	2·6	3·0	3·6	6·0	6·6	7·2
3. Java	—	—	—	0·2	0·3	1·3	5·8	6·2	6·5
4. United States	0·4	1·5	2·0	1·9	1·9	1·7	2·8	3·2	7·4
5. Straits Settlements	2·4	3·2	3·3	3·3	2·9	2·9	2·4	2·0	2·3
6. Austria-Hungary	0·3	0·7	1·2	1·7	3·2	3·8	2·3	2·2	—
7. Mauritius	1·5	2·1	2·5	2·5	2·7	2·4	2·1	1·6	—
8. Japan	—	—	—	0·3	0·8	1·2	2·1	2·6	7·6
9. China & Hong Kong	4·3	3·7	3·5	4·3	2·7	2·2	1·8	1·7	1·9
China	—	*0·5*	*0·6*	*1·2*	*0·9*	*0·8*	*1·0*	*1·1*	*1·5*
Hong Kong	—	*3·2*	*2·9*	*3·1*	*1·8*	*1·4*	*0·8*	*0·6*	*0·4*
10. Belgium	—	0·3	0·9	2·8	3·1	3·9	1·7	2·0	2·8
11. France	1·1	1·2	1·3	1·5	1·4	1·8	1·6	1·5	1·6
12. Italy	0·7	0·9	0·7	0·6	0·9	1·2	0·9	1·0	2·5
13. Netherlands	—	—	—	0·3	0·5	0·7	0·8	0·9	1·8
14. Australia	0·6	0·8	0·6	0·4	0·7	0·8	0·8	0·6	1·5
Average total value in millions sterling	30·75	39·92	46·20	41·46	46·24	59·32	82·95	107·3	198·81

To	'71–76	'81–86	'86–91	'91–96	'96–01	'01–06	'07–11	'11–14	'25–29
1. United Kingdom	50·6	41·7	37·3	31·7	30·1	26·0	25·3	21·8	21·9
2. Germany	0·3	0·7	2·2	6·4	7·5	8·9	10·2	10·4	8·5
3. China & Hong Kong	21·1	15·5	14·4	12·2	12·2	12·8	9·7	7·3	3·8
Hong Kong	—	*11·5*	*10·9*	*7·6*	*7·6*	*7·6*	*5·1*	*3·6*	*0·8*
China	—	*4·0*	*3·5*	*4·6*	*4·7*	*5·2*	*4·6*	*3·8*	*3·0*
4. United States	3·5	3·7	3·8	4·3	5·8	6·7	7·6	7·9	11·2
5. France	6·6	9·1	8·1	8·8	6·4	6·5	6·5	6·7	5·2
6. Japan	—	0·3	1·0	1·6	4·1	5·6	5·8	8·2	12·3
7. Belgium	0·1	3·4	4·5	4·3	3·4	4·4	4·9	5·4	3·6
8. Ceylon	2·8	2·0	2·3	3·0	3·9	3·4	3·7	3·7	4·3
9. Straits Settlements	3·7	4·1	4·9	4·9	5·4	4·8	3·6	3·4	2·6
10. Austria-Hungary	2·0	2·8	3·0	2·5	2·1	2·7	3·5	3·5	—
11. Italy	2·0	4·1	4·4	3·0	2·8	2·8	3·4	3·0	4·4
12. Australasia	0·3	0·9	1·1	4·0	1·4	1·3	1·7	1·7	2·4
Egypt	0·1	3·2	3·7	4·7	1·8	—	1·0[1]	0·8	1·3
Average total value in millions sterling	53·61	67·55	68·50	65·90	68·89	90·73	121·1	157·2	260·60

TOTAL TRADE

	'70–75	'75–80	'80–86	'86–91	'91–96	'96–01	'01–06	'06–11	'11–14	1924
Imports.										
Private merchandise	30·21	32·20	41·06	46·20	41·46	46·24	59·32	80·80	107·29	174·99
Government stores	1·42	1·49	2·14	2·03	2·00	2·81	5·18	4·40	4·26	4·42
Treasure	6·69	9·02	10·20	11·23	8·95	12·66	20·76	24·92	35·28	49·04
Total	38·31	42·70	53·40	59·46	52·41	61·71	85·25	110·11	146·83	228·45
Exports.										
Indian produce	51·94	51·61	64·35	65·57	63·09	66·61	94·51	118·27	157·19	261·99
Re-exports	1·64	1·76	2·29	2·93	2·81	2·28	2·19	2·41	3·43	9·80
Government stores	0·02	0·04	0·05	0·05	0·05	0·09	0·25	0·07	0·09	1·44
Treasure	1·60	2·46	1·03	1·31	3·19	5·46	9·07	4·13	6·21	3·49
Total	55·20	55·91	67·73	69·86	69·15	74·44	106·06	124·88	166·96	279·72

The rupee has been converted at the average rate of exchange on London, namely:

Year	'70–71	'71–72	'72–73	'73–74	'74–75	'75–76	'76–77	'77–78	'78–79	'79–80
Pence	22·5	23·1	22·7	22·3	22·1	21·6	20·5	20·8	19·8	20·0

Year	'80–81	'81–82	'82–83	'83–84	'84–85	'85–86	'86–87	'87–88	'88–89	'89–90
Pence	20·0	19·9	19·5	19·5	19·3	18·2	17·11	16·9	16·4	16·5

Year	'90–91	'91–92	'92–93	'93–94	'94–95	'95–96	'96–97	'97–98	'98–99
Pence	18·5	16·75	15·0	14·5	13·0	13·5	14·5	15·5	16·0

From 1898–99 till the war the average exchange was steady at 16·0.

There were violent fluctuations during and after the war; the average value of the rupee in 1924 was 17·23*d*. The rupee was standardised at 18*d*. in 1927.

[1] The sudden change in the importance of Egypt among the destinations of Indian goods is due to the fact that goods sent to Port Said, largely to await orders, down to 1902–3 inclusive, were all credited to Egypt, while from 1903–4 onwards the ultimate destination was given when that could be ascertained.

it amounted to 57 per cent. Under more normal conditions in 1929 India's exports went to the United Kingdom (21 per cent.),

INDIA

IMPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Raw materials:					
Mineral oils . . .	—	3·8	5·1		
Raw cotton . . .	—	1·7	4·5		
Iron and steel . . .	—	1·5	0·9		
Foodstuffs:					
Sugar	5·8	5·7	2·8		
Alcohol	1·0	1·3	1·5		
Spices	—	1·1	1·2		
Manufactures:					
Textiles—					
Cotton manufactures	24·9	18·9	13·1		
„ yarn .		2·2	2·3		
Artificial silk . .	—	1·5	2·6		
Silk	1·2	1·2	2·3		
Woollen . . .	—	1·4	1·8		
Others. . . .	—	0·6	0·8		
Iron and steel . . .	8·5 [1]	4·9	3·5		
Machinery . . .	4·6	5·6	8·4		
Vehicles and parts . .	—	2·6	3·4		
Hardware . . .	1·6	1·8	2·2		
Chemicals and drugs .	—	1·7	3·5		
Gold and Silver . .	*25·0* [2]	*13·1*	*3·6*		
Total value in million rupees . . .	*318·2*	*277·6*	*137·5*		
Countries:					
United Kingdom . .	54·4	45·1	38·3		
Japan	6·9	7·9	14·1		
United States . . .	5·8	7·6	7·7		
Germany . . .	6·2	6·7	7·9		
Java and Dutch Borneo .	6·4	6·5	2·9		
Belgium	2·8	2·9	2·2		
Italy	1·2	2·8	2·5		
Straits Settlements . .	2·0	2·4	2·3		
France	1·5	1·7	1·4		

[1] Metals, and manufactures of. [2] Approximately.

The rupee is fixed in value at 1*s.* 6*d.*

Japan (11 per cent.), the United States (12 per cent.), Germany (9 per cent.), France (5 per cent.), Italy (4 per cent.). The imports were supplied by the United Kingdom (42 per cent.), Japan (9 per cent.), Java and the United States and Germany (6 per cent. each).

Of recent years there has been evidence in the trade returns that India has little to spare of agricultural produce—the export of wheat has virtually ceased—whilst home manufactures in textiles, iron, and steel have affected the former huge import.

INDIA

EXPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Raw materials:					
Cotton	25·3	19·6	11·2		
Jute	6·9	8·6	5·3		
Hides and skins	1·7	2·5	1·7		
Metals (lead, iron, tungsten, manganese)	—	2·1	—		
Lac	—	2·0	1·0		
Wool	1·3	1·3	0·9		
Foodstuffs:					
Rice	9·9	10·4	6·3		
Oil-seeds and cake	7·4	9·2	7·0		
Tea	8·9	8·9	9·2		
Wheat and wheat flour	—	1·1	0·2		
Manufactures:					
Jute cloth	12·7	9·0	5·2		
Jute bags		7·2	5·0		
Leather	1·9	2·6	2·5		
Cotton goods	2·8	1·8	1·0		
,, yarn		0·7	0·4		
Gold and Silver	*1·0*	*1·3*	*28·6*		
Total value in million rupees	*375·1*	*313·3*	*210·5*		
Countries:					
United Kingdom	24·2	21·9	31·7		
Japan	13·9	11·3	11·5		
United States	8·9	11·1	8·8		
Germany	7·2	8·3	5·9		
France	5·2	5·1	4·8		
Italy	6·5	4·0	3·5		
Belgium	3·7	3·3	3·0		
Australia	2·0	2·1	2·1		
Ceylon	3·6	4·5	4·6		
China	2·4	3·9	2·9		
Netherlands	2·0	2·5	2·6		

In studying statistics it must be remembered that India, until April 1st, 1937, included Burma.

The bulk of India's tea goes to Britain and much of the jute. On the other hand, the oil-seeds are largely taken by the continent of Europe, and much of the raw cotton by Japan.

Seaports. The foreign sea-borne commerce of India proper (exclusive of Burma) is almost confined to four seaports—Calcutta, Bombay, Madras, and Karachi, and nearly 80 per cent. of the whole falls to the share of the first two.

Calcutta, on the Hooghly, an arm of the delta of the Ganges, is the last of a succession of ports which have flourished on the same stream. The others, all of which stood higher up, have declined in consequence of silting, and the same fate is averted from Calcutta only by great engineering works. Founded in 1686, the town was made the seat of government of Bengal in 1772, and of British India in the year following. It remained the official capital of the Indian Empire till October 1, 1912, when it was replaced by Delhi.

Bombay—by far the most important seaport in the west of India, and the rival of Calcutta in commerce and shipping—is likewise a town of recent origin, and a port that has had great predecessors in the same district. The predecessors of Bombay as a seaport were Broach, near the mouth of the Narbadā, and Surat, near the mouth of the Tāpti ; and the history of the three illustrates in an interesting manner the relation between physical features and commercial development. Broach is the oldest of the three. Under the name of Barugaza it is one of the oldest Indian seaports known in commerce with the East or West. Yet it seems always to have had a poor harbour, very difficult to approach. Its difficulty of access is at least mentioned as far back as the first century A.D. But in days when vessels were very small, and navigation slow, the shallowness of the river-mouth and the delay in entering were of very little consequence ; and the mouth of the Narbadā has the advantage of possessing high banks out of the reach of flooding, and being contiguous to a highly productive region. Surat shares with Broach the last-named advantage, and it has much better accommodation for shipping. The Swally (Suwāli) Roads, north of the mouth of the Tāpti, afford a safe anchorage even for large vessels from October to April, though it is dangerous for such vessels during the prevalence of the south-west monsoon. The banks of the Tāpti, on the other hand, are low and liable to inundation, a disaster which has more than once overtaken the town. The advantage of the harbour, however, began to prevail in favour of Surat in the sixteenth century, when direct commerce with Europe had begun. The Portuguese, the Dutch, and the English established factories (that is, trading stations) here, and in the seventeenth and eighteenth centuries Surat was the greatest seat of foreign commerce, and, latterly at least, the most populous town in India. Bombay, built on a small island, now connected, along with another larger island (Salsette) behind it, with the mainland, has the immense advantage over both its predecessors of possessing a harbour safe for large ocean-steamers in all weathers ; but it had the misfortune to be backed by moun-

tainous country, which cut it off from the more productive regions beyond. In 1661 Bombay Island was acquired by Charles II. from the Portuguese, and in 1687 the East India Company, to which it had previously been handed over, transferred thither, from Surat, the headquarters of their possessions ; but it was not till after the establishment of the improved communications with the interior mentioned above that Bombay rose to the commanding position it now holds in the commerce of India. Its two famous predecessors are now visited only by coasting vessels, but the inland trade of Surat is still important.

Karachi stands on a small bay to the west of the mouths of the Indus, and has been provided with a splendid harbour. Its wheat trade especially grew with remarkable rapidity after the planting of the irrigation colonies in the north-west, but has now been replaced by cotton.

Most of the other seaports of the west coast have only fair-weather harbours—safe in our winter months, but rendered dangerous by the heavy surf during the prevalence of the south-west monsoon. The harbour of Goa (Portuguese) is an exception, and the trade has begun to revive since Mormugão, at the south-west extremity of the harbour, has been connected by rail with the interior, as shown on the map on p. 283. Calicut, which has an anchorage 24 feet deep at low-water spring-tides, and Cochin, which has a harbour available for ships of no more than 15 feet draught, still retain some importance in connection with the trade in pepper and spices, which drew the Portuguese to these ports at the end of the fifteenth century. Cochin is being made into a deep-water harbour.

The extraordinary importance of the trade in pepper and spices in past times it is difficult for us now to realise. The quantities that reached Europe were small compared with those which make up the trade of the world in such commodities at the present day, but the differences in value at the place of origin and in Europe enabled those merchants who escaped the risks of the trade to reap enormous profits. The cargoes brought back by Vasco da Gama after the voyage on which he discovered the sea-way to India, were mainly of spices and pepper, and they are stated by Correa, the Portuguese historian of the voyage, to have yielded a profit on the voyage of 6,000 per cent. In Thomas Mun's *English Treasure by Forraign Trade*, written about 1630, the price of pepper in the East Indies is stated to have been 4*d.* a pound when it was 20*d.* in England. In a recent year the average price of pepper at Bangkok was a little more than 7*d.*, when it varied from 8¼*d.* to 9¼*d.* in the London market. As to the risks of the trade in past times, see p. 95.

The south-east coast of India, where a low plain slopes gently out under a shallow sea, did not possess till recently a single safe harbour, or navigable river-mouth. Ships anchor off the shore at several

roadsteads, and goods and passengers have generally to be landed in flat boats through surf. Madras has been made a seat of great trade, a trade, however, of less than one-sixth of the value of that of Bombay, notwithstanding the populousness and productiveness of its hinterland, and even this has been achieved only by waging a constant struggle against natural conditions. The site of the city was ceded to the English East India Company in 1639, when Fort St. George was erected there. About a hundred years later Madras was already the most populous city in southern India. Down to the latter part of the nineteenth century, however, the trade was carried on in the same manner as at the other ports on this coast. In 1881 a harbour was nearly completed, when it was in great part destroyed by one of those irresistible hurricanes by which both sides of India are liable to be swept, especially about the change of the monsoons (May and October), and which on the eastern side raise the waves to a height unparalleled elsewhere. A new harbour was, however, completed in 1895, two moles of about 3,900 feet in length being run out seawards leaving an opening of 515 feet between them ; but great difficulty is experienced in keeping it dredged owing to the enormous quantities of sand drifted northwards and southwards by the monsoon currents.

The voyage from Madras to Europe or the reverse is considerably lengthened by the necessity of passing round the island of Ceylon, which is nearly connected with the mainland by a string of islands and a shallow bank known as Adam's Bridge. The long-discussed proposal for connecting India with Ceylon by rail by this route was abandoned in favour of a part-rail part-steamer connection, which was established early in 1914. Only one channel, called the Pāmbam (Paumben) Passage, across this 'bridge' has been sufficiently deepened to allow of its being used by good-sized coasters, and though dredging is still going on it is doubtful whether it can ever be made navigable for large ocean-going vessels.

The minor Indian seaports are Chittagong, on the north-east side of the Bay of Bengal ; Cocanāda, at the end of one of the canals of the delta of the Godāvari ; and Tuticorin, in southern Madras, on the Gulf of Manar, this last having a harbour 12 feet deep at low water, which enables it to carry on a considerable export trade. The completion of the fine harbour of Vizagapatam in 1933 places that port among the leading ones of India.

Landward Trade. The landward foreign trade of India (not included in the tables) has a total value of from six to seven millions sterling each way, including the trade with Kashmir. The trade through the western passes makes up about 20 per cent. of the whole landward trade.

Inland Cities and Towns. Delhi, the capital of India, lies between the great irrigation province of the Punjab and the United Provinces

(Ganges Plain). The district has been constituted a small province. Delhi is a large city of 300,000 and owes its importance largely to its position—from which all parts of the country are readily accessible. In the past when India was invaded from the north-west, Delhi had to be passed since it commanded the easy route lying between the Himalaya Mountains on the north and the plateau on the south. In the old days the land routes of the north-west joined here the water-routes of the Jumna and Ganges. Now Delhi has become a railway junction. The cotton of the neighbouring irrigated lands is sent to mills at Delhi. At a convenient distance to the north are the healthy heights of the Himalayas, on a spur of which India's summer capital, Simla, has been built.

Going down the broad Ganges plain to the east, the traveller passes through the United Provinces. Here Agra, formerly one of the great cities of the Mogul Empire and famed for the Taj Mahal—perhaps the finest building in India—lies on the River Jumna. Further east the provincial capital, Allahabad, is at the junction of the Jumna and the Ganges. In the Ganges-Jumna 'Doab' (the land between the rivers) between Allahabad and Delhi is Aligarh, a collecting centre and famed for the dairying industry elsewhere so markedly absent in India. Above Allahabad on the Ganges is Cawnpore; to the north, also in the United Provinces, is Lucknow. Below Allahabad, Benares is a Hindu cultural centre on the Ganges.

Eastward of the United Provinces is the Province of Bihar with Patna on the Ganges which has given its name to Patna rice. In Bengal there are several large jute-mill towns on the Hooghly north of Calcutta. On the western border of Bengal is the coal-field, whilst in the east Dacca is the great centre of the delta. On the healthy heights of the Himalayas to the north of Bengal lies the hill station of Darjeeling.

Westwards of Delhi is the Punjab—the Province of the Five Rivers or tributaries of the Indus—with Lahore the capital, Amritsar and Rawalpindi. Multan is the central town for the very dry south-west Punjab.

Between the Punjab and the frontier is the North-West Frontier Province where Rawalpindi in its irrigated valley guards the Khyber Pass route to Afghanistan and Russia.

The province of Sind occupies the lower Indus Valley.

In Peninsular India Jubbulpore and Nagpur, both in the Central Provinces, have cotton mills. Farther south Hyderabad, the fourth city of India, is capital of the state of the same name (the Nizam's Dominions). Bangalore and Mysore are the chief towns of Mysore. In Madras Presidency, Ootacamund is the hill-station (in the Nilgiri Hills), Trichinopoly and Madura are old cities of the south.

Baluchistan is composed mainly of arid and unproductive

tablelands inhabited by scattered tribes. Its government is now under British control, and a tract in the north-east composed of the districts of Pishin and Sibi, and containing the fortress of Quetta (5,500 feet), forms part of British India. This place is now connected with Sind by a railway with one loop running eastwards up the Nari pass, and another (with gradients of 1 in 24) up the Bolan pass. The idea of opening a trade-route from Quetta through northern Baluchistan with Sistán and Meshed in Khurasan (Iran), a distance of more than 1,000 miles, was long entertained. A caravan-route was at last established about 1898, but the trade by that route, though it grew rapidly, remained insignificant. Later the railway was carried westwards from Quetta through Nushki to Duzdap within the Iranian (Persian) frontier, and though of strategic interest, the traffic remained so insignificant that the railway is now disused.

Kashmir is the westernmost of the states traversed by the Himalayas, and is mainly composed of lofty mountains. It includes, however, the lovely valley of the same name lying, at the height of rather more than 5,000 feet, in a latitude corresponding to that of northern Morocco. Srīnagar, on the Jehlam in this valley, is the largest town in the state and the centre of trade, the whole volume of which is also equal to about 20 per cent. of the landward trade of India. From Srīnagar there are several routes both south to the Punjab (the chief route being that leading to Amritsar) and north to the valley of the Indus : and from Leh, in the valley of the Indus in the east of Kashmir, a trade-route diverges northwards to Eastern Turkistan, across the highest pass in the world so crossed. This is the well-known Karakoram Pass, 18,500 feet in height—that is, upwards of 6,000 feet higher than Leh, and upwards of 15,000 feet higher than the towns of Eastern Turkistan. The chief articles of import into India from or through Kashmir are shawl-wool ; charas, an intoxicating drug made from hemp ; borax, and the precious metals. The exports, as in the case of all the other frontier states, include both European and Indian products.

With *Sikkim*, *Bhutān*, and the north-eastern states beyond the frontier of Bengal and Assam, the trade is very trifling, but hope is entertained of developing a considerable trade with Tibet by a series of easy passes known to exist in Sikkim. These passes, about 13,000, 14,000, and 15,000 feet high respectively, would afford communication with the most productive part of Tibet, and on the Indian side are within a short distance of the railway to Darjeeling.

NEPĀL. The native state of Nepāl, entirely independent of India, the populous parts of which lie south of the main range of the Himalayas, and have many routes to the Indian plains, absorbs more than half the landward foreign trade of India. The chief imports therefrom are food grains, oil-seeds, timber, cattle, and

horns. From Kātmāndu, the capital, two routes branch over the central range of the Himalayas, and by means of these a small trade is carried on with Tibet. Nepāl is an interesting country ruled on military lines by the Gurkhas, one of the world's most famous military races. The country is still largely closed to Europeans, slavery was only abolished in 1924–26, and the first telephone was installed in 1927.

Possessions of European Powers in India. Of the once widespread possessions of France only a few big tracts remain of which the chief are Pondicherry and Karikal. The Portuguese territory of Goa is larger, and Portugal still holds Daman and Diu.

TOWNS OF INDIA, 1931

Calcutta	1,486,000	Karachi	264,000
Bombay	1,161,000	Poona	250,000
Madras	647,000	Cawnpore	244,000
Hyderabad	467,000	Agra	230,000
Delhi	447,000	Nagpur	215,000
Lahore	430,000	Benares	205,000
Ahmedabad	314,000	Allahabad	184,000
Bangalore	306,000	Madura	182,000
Lucknow	275,000	Srinagar	174,000
Amritsar	265,000	Patna	160,000

INDO-CHINA

The peninsula of Indo-China, also called the Eastern Peninsula and Further India, is the peninsula between India and China. To the south is a long narrow subsidiary peninsula, called the Malay Peninsula or Malaya. The whole is now divided between Great Britain, Siam, and France. The British sphere of influence is made up of the former empire of Burma (which, under the Government of India Act, 1935, became an independent member of the British Empire instead of being merely a province of India) together with the Straits Settlements and the protectorates of the Federated and Unfederated Malay States; the French of Lower Cochin-China, Cambodia, Annam, and Tong-king. The northern part of the interior, which is very mountainous, is occupied by Shans, belonging partly to British and partly to Siamese and French territory.

The mountainous character of a large part of the country, especially the north to south alignment of the mountains, the existence of numerous extensive swamps in the more level tracts of the interior, and the defectiveness of the communications, go a long way to account for the low density of population, but among other causes have been devastating wars, inroads of robber bands from the

mountains, and other consequences of the want of strong government. Since Burma has been in the hands of the British, there has been a constant stream of settlers southwards and westwards, as well as of emigrants from India proper into that territory, and population, production, and commerce have rapidly increased. Owing to the scantiness of population relatively to the resources of the territory, Burma is still to some extent in the position of a new country. Similarly the possibilities of expansion in French Indo-China, Siam, and Malaya have led to a huge influx of Chinese. This leads, when security and a market are offered, to the rapid occupation of the land for the raising of export produce, notably rice and, in Malaya, rubber.

BURMA. Until April 1st, 1937, Burma was one of the provinces of the Indian Empire ; it was, in fact, the largest, having an area of a quarter of a million square miles, but was markedly contrasted to the remainder of India in that the population of this vast area is only a little over 15 millions. The separation gives point to the marked contrast between Burma and India proper, and the position of the 'Cinderella' province had long been an anomalous one. Burma can be described as an undeveloped monsoon country with great possibilities of expansion and economic activity. Its problems include those connected with immigration of people from over-populated India on the one hand, and over-populated China on the other. It is, however, cut off from India by a wall of mountains and from the thickly populated parts of China by a broad expanse of plateaus and mountains, so that almost the only approach to the country is by sea through its major port of Rangoon or more recently, for special purposes, by air. It is this remarkable isolation from its neighbours that has left Burma in the position of an undeveloped backwater ; even at the present day the nearest way from Assam to northern Burma, a distance of 100 or 150 miles across the mountains as the crow flies, is *via* Calcutta round to Rangoon, up the Irrawaddy and so to complete the journey in about ten days.

In its physical build the remarkable feature of Burma is the north-south alignment of its ranges and its principal river valleys. From west to east there is first of all the complicated folded mountain chain of the Arakan Yoma, between which and the sea, the Bay of Bengal, there are but small plains suitable for the support of a population, the most extensive being around the town of Akyab. At present no railway or motor road crosses these mountains. Then comes the valley of the Chindwin, somewhat narrow and sparsely populated, which is extended southwards into the valley of the lower course of the Irrawaddy. The valley of the lower Irrawaddy, through the heart of the Dry Belt, is broad and supports a considerable population, whilst the fertile delta of the Irrawaddy is the

most important part of the whole country. Then comes another line of mountains from north to south, much lower in the south, where it forms the forested ridge known as the Pegu Yoma ; this line of mountains is breached about the centre by the Irrawaddy River. Then comes the valley of the upper course of the Irrawaddy (as far as Mandalay) and the continuation of the valley southwards now drained by a smaller stream, the Sittang ; both these valley regions are important. The whole of the east of the country is occupied by a broad plateau, the Shan plateau, through which runs the deep cleft occupied by the Salween River. The Shan plateau is continued southwards into the broken forested country, towards Tenasserim and the Malay peninusla.

Structurally, Burma falls into two parts : the western half with its valley plains and its folded mountains, of comparatively recent geological age, and the eastern half which consists of a great block of ancient rock, including many metamorphic rocks, tracts of limestone and other areas which are most important because of their yield of minerals. In the western half of the country, in the valley of the Chindwin and the Irrawaddy, is a succession of oil-fields, so that Burma is the rival of Trinidad as the largest producer of oil in the British Empire, though its total production is only about 0·6 or 0·7 per cent. of the world's total. The two leading fields are Singu and Yenangyaung, both near the River Irrawaddy. The oil is sent from these fields by pipe-line over 300 miles to the refineries near Rangoon. Burmese oil is rich in volatile constituents and is largely refined for its yield of petrol rather than used as crude oil. There is not much possibility of the further discovery of oil in Burma, but the fields that exist are very carefully worked. In the eastern half of the country one finds in the north the famous old Burma ruby mines, but the drop in the value of rubies and the growth in the manufacture of artificial rubies has led almost to the disappearance of the mining of gem stones. Not far away is one of the largest silver-lead mines in the world, that of Bawdwin with its refinery or smelting works at Namtu, operated by the Burma Corporation. The minerals produced here are sent by rail to Rangoon. Other mineral deposits are known to occur in the Shan Plateau, but many of them are too inaccessible to be worked at present. In the south of the country, however, in Tenasserim particularly, one finds the tin and tungsten deposits, some worked in the alluvial valleys, some as lode deposits, which fluctuate in importance according to the world price of tin.

Climatically, Burma has the same monsoon climate as India. The position of the Tropic of Cancer should be noticed : it passes through Burma in such a way that about a third of the country lies outside the tropics, the remainder within. Thus in the cool season there is a gradual decrease in temperature as one goes from the

south of the country where it is really always hot and moist, towards the north, where even in the valleys frosts may occur in January. The really important point about Burma is the way in which the mountain ranges of the west and the Irrawaddy delta catch the full force of the monsoon, and so in places may enjoy, or rather suffer from, a rainfall of as much as 200 inches. Most of the great rice region of the delta has a rainfall of about 100 inches—this is the total received by Rangoon. In the heart of the country, which is sheltered from the rain by the surrounding mountains, the rainfall may drop to as low as 20 inches, resulting in semi-desert conditions. Thus, within a limited area there is an enormous range of climatic conditions with a corresponding range in products.

Similarly, the natural vegetation of Burma ranges from the dense equatorial type of forest in the wettest regions, a type of forest which is little exploited because of the variety of trees, but which to a considerable extent has been destroyed by the shifting cultivation of the natives, through the very important teak forests where the rainfall is between 40 and 80 inches a year. In normal times timber, particularly teak, forms the second most important export of the country. It must not be supposed that these forests consist entirely of teak-trees : teak does not as a rule constitute more than 15 per cent. of the total. The forests, which belong to the group of the monsoon forests, lose their leaves as a protection against the great heat of the hot season. The drier parts of the country have too little rainfall for the adequate growth of forest and are covered with almost useless scrub. A yellow dye, known as 'cutch,' is made from the acacia-trees of part of this belt.

In all the wetter parts of the country rice is the great crop, particularly in the Irrawaddy delta and the smaller delta and valley of the Sittang, together with the limited tracts of flat land along the coasts of Arakan and Tenasserim. Burma rice is not of the highest quality and is used in the European market more for industrial purposes than for human food. Burma is, however, with Siam and French Indo-China one of the great rice-exporting countries of the world, and rice constitutes easily the largest export. The grain is taken by 'paddy' boats through the creeks or canals of the delta to Rangoon or to Bassein, where in the rice mills the husks are removed and the rice exported.

In the Dry Belt of Burma there is a certain amount of irrigation, but much opportunity exists for more. The Dry Zone crops are the usual millet and sesamum, together with a certain amount of cotton and the very important crop, ground-nuts.

The population of Burma consists of about a million people belonging to backward hill tribes who constitute the sparse population of the Shan plateau and the hills, and are also found in isolated groups elsewhere. They are interesting but economically unim-

portant, and in general they are organised into native states under the rule of their own chiefs. Then about another million of the population consists of immigrants. In the first place there are the Chinese who came to the country mainly to form a sort of middle class consisting of artisans, office clerks, shopkeepers, and so on. The Chinese are penetrating up-country to the villages and are intermarrying with the Burmese. There are in Burma practically no Chinese coolies. Coolie labour is performed by the immigrant Indians, who are to be found in large numbers working on the docks in Rangoon and up-country on the railways or near main lines of communication. They have a lower standard of living than the native Burmans, and tend to complicate the life of the country by thus 'undercutting' the natives. The remaining 13 million people belong to the Burmeser ace. The Burmans are Mongols allied to the Chinese or the Malays, and by religion they are Buddhists. Sporting, gentlemanly, with a natural sense of humour, the Burmese are delightful people possessed of good brain power but frequently lacking the concentration or devotion to hard work which is necessary in this modern, sordid world and hence liable to suffer from the competition of the Indian on the one hand or the Chinese on the other.

The country has a metre-gauge railway system which connects Rangoon, the capital and chief port, with Prome, the port on the Irrawaddy to the west and with Mandalay *via* the Sittang valley. Mandalay is about the same distance from Rangoon as Edinburgh is from London. A fine new rail and road bridge has now been built across the Irrawaddy at Mandalay and the railway runs considerably farther north and has branches up into the hills. The main highway of Burma is still, however, the river Irrawaddy, which is navigable for a thousand miles from its mouth. Its chief tributary, the Chindwin, is also used. Regular services of the Irrawaddy Flotilla Company run up and down the river and carry much traffic. There is much river traffic, too, in the delta as well as on other rivers in Burma. A great proportion of the timber for the saw-mills of Rangoon is brought down by raft.

Notice the position of the old capital of the country (Mandalay) in the heart of the Dry Belt.

Towns of Burma, 1931

Rangoon	400,000	Mandalay	148,000

SIAM. Siam, the only part of the Indo-Chinese peninsula to remain independent, shares with its neighbours—Burma in the west and French Indo-China in the east—the monsoon climate, productivity of the soil, and low density of population. The heart of

the country is the valley of the Menam or River Chao Phaya, on which Bangkok stands and where much of the population is concentrated. The Menam is navigable for steamers only to the confluence of the two main headstreams, which meet to the south of 16° N.; and of these the eastern one is the only one navigable by boats. Timber (teak and sappan wood) is floated down the western branch from Raheng. In 1915 a comprehensive irrigation scheme for the irrigation of different parts of the Menam basin was laid before the Siamese government by an official lent by the government of British India. Parts of the scheme have since been completed.

The railway from Bangkok, the capital, to Khorat, running in part through a rich alluvial plain, was opened in December 1900, and has been extended almost to the French border, and a branch running northwards has been carried to Chieng-mai or Kiang-mai, a town lying in a fertile valley and long celebrated as a commercial centre. This line it is proposed to carry as far north as Kiang-sen on the Siamese frontier. The railway running south-west from Bangkok through Pechaburi passes through a rich agricultural district, and extends to the Malayan border, connecting there in two places with the Malayan system, so that excellent through expresses link Bangkok with Singapore. Bangkok has benefited greatly by the development of aerial communications.

Like its neighbours Siam has an export of its surplus rice, together with tin and timber (teak).

FRENCH INDO-CHINA. The French sphere of influence covers the delta of the Mekong (Cochin-China) as well as Cambodia and Laos in the hinterland and the coastal tracts of Annam and Tong-king.

Above the large delta in Tong-king the Song-koi is navigable for steamers to within the Chinese frontier; but the longest river of the peninsula, the Mekong, has its navigation greatly impeded by rapids, the lowest of which are situated to the south of the Siamese-Cambodian frontier. Saigon, the chief port of Cochin-China, has been connected by rail with Mytho, on one of the main arms of the Mekong delta, although the Saigon river is likewise connected with the larger stream by a natural navigable channel uniting these two ports.

In Annam the chief port is Turan or Tourane, which lies on a bay about half a degree to the south of Hué, the capital of the province. In Tong-king the chief port is Haifong or Haiphong, which has been built by the French on former rice-swamps on the delta of the Song-koi, and is now a town lighted by electricity, with regular steamer services to Hong Kong, Pakhoi, and Hoi-hou (island of Hainan), and having railway connections amongst others with the Chinese province of Yunnan of which it thus becomes the outlet. The railways are all on the metre-gauge. That to Hanoi, the capital

of the province, crosses the Red River by a bridge more than a mile long. Hanoi itself is accessible to smaller sea-going vessels, and carries on direct trade with Hong Kong. Although on the site of the old town, it is entirely a French town, solidly and even almost magnificently built in European style, lighted by electricity and well supplied with water. Haifong is the centre of an important transit trade with Yunnan, from which are received tin, zinc, antimony, hides, horns, lacquer oils, in exchange for cottons and other manufactured goods, and since the completion of the railway in 1911 this trade has largely increased.

CEYLON

The island of Ceylon, a British colony now administered by a Governor aided by a State Council, about half the size of England, is mountainous in the south, a level sparsely wooded plain in the north. The south-west, which is the most populous region, gets the benefit of rain from both the south-west and north-east monsoons. Here the plains, valleys, and lower hill terraces are covered with coconut plantations and rice-fields belonging to the natives (Sinhalese), whilst the slopes of the foothills (below 5,000 feet) are laid out in rubber plantations by Europeans. The extensive tea-gardens of higher elevations are also under European control. Coffee, once important, was eradicated by disease, and the amount of cocoa grown is very limited. The labourers on these plantations are mainly immigrants from southern India. The northern plains are arid and require irrigation. Nowadays they are very scantily peopled, but remains of gigantic reservoirs and other extensive ruins show that at one time the population in these parts was much denser. The depopulation is probably the result of malaria and other fevers. The island has many minerals, but gemstones (notably sapphires) and a very pure graphite (containing more than 90 per cent. of carbon) are the chief of commercial importance. Pearl fisheries are carried on in the Gulf of Manar under government control, a 'fishery' being held in certain years only. The famous spices of Ceylon include cinnamon and cardamoms; citronella oil is also a characteristic product. Manufactures on a considerable scale are restricted to the preparation of agricultural products—connected with the tea, coconut, rubber, and cacao plantations. The chief seaport of the island is Colombo, which is connected by broad gauge (5 ft. 6 in.) government-owned railways with the chief centres including the old capital and sacred Buddhist centre of Kandy. Galle on the south coast, which was a much-frequented port of call before the opening of the Suez Canal and before the completion of the fine harbour at Colombo, has fallen into disuse.

Colombo (1931) . . .	284,000

CEYLON[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.						Percentages of Total Value.					
	'71–75	'01–05	'06–10	'11–13	'24–29	'33–35	'71–75	'01–05	'06–10	'11–13	'24–29	'33–35
1. Rice and paddy	1·81	2·49	2·92	3·30	6·59	—	31·4	32·8	32·2	27·2	26·4	25·9
2. Coal and coke	0·19	0·73	0·83	0·94	1·15	—	3·7	9·6	9·1	7·8	4·6	3·5
3. Specie and bullion	0·96	0·71	0·66	0·64	0·95	—	18·2	9·4	7·3	5·3	—	—
4. Cottons	0·81	0·44	0·58	0·84	1·64	—	15·5	5·7	6·4	6·9	6·7	6·2
5. Manures	—	0·12	0·27	0·48	0·90	—	—	1·6	2·9	4·0	3·6	2·5
6. Sugar	—	0·15	0·21	0·33	0·99	—	—	1·9	2·4	2·7	3·9	3·0
7. Grain and flour, ex. rice	0·09	0·16	0·21	0·30	0·63	—	1·7	2·1	2·3	2·4	2·5	2·6
8. Cutlery and hard-ware	0·04	0·07	0·14	0·23	—	—	0·8	0·9	1·5	1·9	—	—
9. Tea chests	—	0·10	0·13	0·17	0·34	—	—	1·3	1·4	1·4	1·4	1·3
10. Curry stuffs	0·04	0·11	0·12	0·14	0·44	—	0·9	1·4	1·3	1·2	1·8	2·0
Average total value	5·25	7·60	9·07	12·13	26·03	15·5						

Principal Countries.[2]	Percentages of Total Value.					
	'71–75	'01–05	'06–10	'11–13	'24–29	'34–35
1. India	61·4	56·4	51·2	47·9	42·8	35·9
2. United Kingdom	28·2	25·9	25·3	28·0	22·6	19·5
3. Straits Settlements	—	1·0	5·6	5·0	2·1	1·1
4. Australasia	3·0	3·7	3·4	2·6	3·1	2·3
5. Germany	—	1·9	2·4	3·1	2·1	1·9
6. Maldive Islands	0·7	1·6	1·6	1·2	1·3	1·7
7. Japan	—	1·2	1·2	1·8	2·3	7·0
8. Hong Kong	0·4	0·8	1·2	1·1	—	—
9. United States	—	0·6	0·9	1·2	3·2	2·3
10. Austria-Hungary	—	0·8	0·9	0·5	—	—
12. Java	—	0·1	0·7	1·6	3·5	2·8

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.						Percentages of Total Value.					
	'71–75	'01–05	'06–10	'11–13	'24–29	'33–35	'71–75	'01–05	'06–10	'11–13	'24–29	'33–35
1. Tea	0·001	3·69	4·93	5·70	13·87	—	0·01	51·8	53·9	41·7	50·1	63·0
2. Coconut-oil	0·21	0·64	0·85	0·90	1·13	—	4·7	9·4	9·3	6·6	4·1	5·5
3. Plumbago	0·10	0·53	0·60	0·53	0·17	—	2·2	7·9	6·6	3·9	0·6	0·8
4. Copra	—	0·39	0·56	0·98	2·21	—	—	5·8	6·1	7·2	7·9	3·6
5. Rubber	—	0·01	0·53	3·57	17·60	—	—	0·2	5·8	26·1	26·3	17·7
6. Desiccated coconut	—	0·20	0·30	0·48	1·22	—	—	2·9	3·2	3·5	4·4	2·9
7. Cacao	—	0·16	0·20	0·18	0·18	—	—	2·4	2·2	1·3	0·7	0·7
8. Cinnamon	0·06	0·16	0·18	0·16	0·26	—	1·4	2·4	2·0	1·2	1·0	0·5
9. Coir and manufactures	—	0·13	0·17	0·20	0·30	—	—	1·9	1·9	1·5	1·1	1·2
10. Areca-nuts	0·08	0·10	0·16	0·18	0·23	—	1·8	1·4	1·7	1·3	0·8	0·5
11. Citronella-oil	—	0·06	0·08	0·09	0·12	—	—	0·8	0·9	0·6	0·4	0·4
12. Poonac	—	0·08	0·07	0·06	—	—	—	1·2	0·8	0·4	—	—
18. Coffee	3·16	0·03	0·01	—	—	—	71·7	0·5	0·1	—	—	—
Average total value	4·40	6·73	9·14	13·69	29·23	16·3						

Principal Countries.[2]	Percentages of Total Value.					
	'71–75	'01–05	'06–10	'11–13	'24–29	'34–35
1. United Kingdom	70·6	52·2	48·8	47·2	40·8	51·3
2. United States	2·9	8·0	10·9	15·9	23·6	12·6
3. Australasia	1·1	8·1	7·6	6·1	6·6	6·4
4. Germany	—	6·8	7·3	8·5	4·5	2·6
5. Russia	—	4·8	7·1	5·8	0·4	0·1
6. India	16·3	8·2	5·2	3·9	4·0	4·8
7. Belgium	—	2·3	2·6	3·9	1·0	1·4
8. Canada, from 1894	—	2·0	2·3	1·9	1·7	3·0
9. China	—	1·3	2·0	1·5	0·3	0·1
10. Austria-Hungary	3·9	1·5	1·8	0·7	—	—

[1] Special Exports for principal articles in 1924–29, but general for total and countries of destination.
[2] 'Countries of Production' after 1900 : 'Countries whence imported' in earlier years.
Exchange rate for 1924–29 : 15 rupees = £1 ; 1933-5, 13·33 rupees = £1 (1 rupee = 1s. 6d.).

On the east coast there is a fine harbour at Trincomali, connected with Colombo by rail in 1925, and now a British naval oil-base.

The **Maldive Islands** are a group of coral islands, thickly clothed with coconuts, lying 400 miles south-west of Ceylon of which they form a dependency.

MALAYA. The **Malay Peninsula** or Malaya is the name of that part of Indo-China which projects south-eastwards nearly to the equator. It is highly mountainous, and clothed with dense tropical forests, but at its northern end, at the Isthmus of Kra (between 10° and 11° N.), there is a gap separating the mountains of this peninsula from those of the main body of Indo-China. This gap is only about 100 feet in height at the highest part, and it has often been proposed to pierce this isthmus by a ship-canal, which would shorten the route from Calcutta to China by 660 miles and that from Burma to Bangkok by 1,300 miles.

The peninsula is partly under British rule, partly divided among a number of small states. The states in the north acknowledge to Siam, those in the southern two-thirds to Britain. The island of Singapore in the extreme south, the small territory of Malacca on the west coast, the island of Penang, and the patch of mainland called Province Wellesley further north, together with the more distant Cocos or Keeling Islands, and Christmas Island in the Indian Ocean and the island of Labuan off Borneo, form the British Crown colony of the Straits Settlements. The remainder of the south is occupied by the Federated Malay States of Perak,[1] Selangor, Negri Sembilan, and Pahang, and the protected states of Kedah, Kelantan, Trengganu, and Perlis, and the independent state of Johore, which, however, has placed itself under British control as regards its external relations. The governor of the Straits Settlements is also High Commissioner of the Malay States. The natives of the peninsula are Malays, whence the name; but the Malays are being ousted in trade and industry by settlers of a more enterprising temperament. These are mostly Chinese, a particularly important section of the population, and Indians. The latter come mainly from southern India, and are known in the peninsula as Klings. The Chinese came as permanent settlers and are largely concerned with mining and with commerce and industry in the towns; the Indians are mainly temporary immigrants working on the rubber estates.

Rubber, copra, pepper, pineapples, and recently palm oil, and many other tropical products are obtained from plantations. The chief export products are rubber and tin, for the mountains running through the peninsula and reappearing in islands further south are the richest part of the world in this metal. The wealth derived from these tin mines and later from rubber plantations was the chief means of converting a proud and lawless people into a submissive

[1] The final *k* is not pronounced.

and orderly community. It rendered possible a capable and h government, and enabled native chiefs to see their interest in l ing to the monitions of British residents clothed with little f

Straits Settlements

General Imports, including Bullion and Specie.

Principal Articles	Average Value in Millions Sterling.[1]				Percentages of Total Value.			
	'91–95.	'06–10.	'11–13.	1929.	'91–95.	'06–10.	'11–13.	19
1. Tin and Ore	3·01	8·49	11·56	—	14·3	21·6	22·4	
2. Rice	2·23	4·08	6·74	11·14	10·7	10·4	13·1	10
3. Bullion and specie	2·42	2·31	2·50	2·02	11·5	5·9	4·9	2
4. Cottons	1·37	2·29	3·03	4·50	6·6	5·8	5·8	4·
5. Opium	1·10	1·32	1·12	—	5·3	3·4	2·2	
6. Copra	0·35	1·16	1·87	—	1·7	2·9	3·6	—
7. Rubber	—	1·03	1·59	19·52	—	2·6	3·1	9·
8. Fish, dried, etc.	0·56	0·99	1·28	1·54	2·7	2·5	2·5	1·
9. Pepper	0·61	0·88	0·89	2·11	2·9	2·2	1·7	2·
10. Coal and coke	0·32	0·83	1·04	1·13	2·0	2·1	2·0	1·
Average total value	20·96	39·30	51·63	102·80				

General Exports, including Bullion and Specie.

1. Tin	3·38	9·08	12·14	21·25	18·0	26·0	28·2	19·7
2. Rice	1·76	4·00	5·14	3·27	9·4	11·5	12·0	3·0
3. Bullion and specie	2·57	2·20	1·87	0·66	13·7	6·3	4·3	0·6
4. Cottons	0·85	1·42	1·38	1·10	4·5	4·1	3·2	1·0
5. Rubber[2]	0·09	1·35	3·04	50·48	0·5	3·9	7·1	46·8
6. Copra	0·43	1·22	2·00	3·84	2·3	3·5	4·7	3·6
7. Opium	0·95	1·07	1·01	—	5·1	3·1	2·4	—
8. Pepper	0·76	0·97	0·96	2·05	4·1	2·8	2·2	1·9
9. Fish, dried, etc.	0·54	0·94	1·07	1·63	2·9	2·7	2·5	1·5
10. Gambier	0·79	0·60	0·47	—	4·2	1·7	1·1	—
Average total value	18·78	31·89	43·01	107·97				

[1] Exchange rate: 8·57 dollars = £1 (Straits Settlements), or \$ (S.S.) 1·00 = 2*s.* 4*d.*

[2] Previous to 1912 rubber from Malay Peninsula transhipped at Singapore and Penang was included in imports and exports. Value in 1911 about £1,493,000.

Countries of Origin and Destination (Percentages).

From	'91–95	'06–10	'11–13	1929	To	'91–95	'06–10	'11–13	1929
1. Malay States	13·7	21·3	20·7	—	United Kingdom	18·9	24·8	23·8	10·9
2. Dutch Poss.	14·9	15·0	14·9	34·1	Dutch Poss.	22·3	14·8	13·7	11·9
3. India	15·3	12·4	13·0	8·0	Malay States	9·2	13·8	14·9	—
4. Untd. Kingdom	13·9	11·6	10·6	15·1	United States	6·7	9·7	11·7	40.0
5. Siam	7·7	10·0	9·1	10·2	India	6·0	5·8	6·3	4·4
6. Hong Kong	10·2	8·9	8·8	4·3	Siam	6·2	5·5	3·4	3·3

authority. Weapons, formerly universally worn, have long been discarded. The prosperity of mining encouraged the development of various agricultural industries and the great rubber boom of 1914–19 made possible a great development of communications. A railway line running from Province Wellesley in the north to the

south of the peninsula was completed in December 1908. A causeway (with a small bridge) across a shallow part of Johore Strait permitted the connection of this line with the island of Singapore

BRITISH MALAYA

GENERAL IMPORTS

—	Percentages of Total Value.				
	1924.	1920–30.	1931–35.	—	—
Foodstuffs	Not available	—	*26·5*		
Rice		10·9	9·3		
Pepper		1·6	1·9		
Condensed milk		1·6	1·8		
Fish (dry and salted)		1·6	1·7		
Sugar		1·5	1·7		
Raw materials		—	*41·3*		
Para rubber		14·0	8·6[1]		
Tin ore		6·9	6·4		
Kerosene and petrol		10·2	15·1		
Liquid fuel		2·3	3·2		
Chemicals, drugs, and dyes		1·4	1·9		
Tobacco (raw and manuf.)		3·9	3·6		
Manufactures		—	*29·2*		
Cotton goods		5·1	4·9		
Other textiles and manufrs.		3·3	3·9		
Iron and steel		3·1	2·9		
Machinery		2·4	1·4		
Total value in million S.S. $		*888·5*	*421·5*		
Countries:			1931–34.		
Dutch East Indies		34·0	27·6		
Siam		10·9	10·7		
India		8·3	6·6		
China		4·3	4·6		
Hong Kong		3·8	1·0		
Sarawak		3·6	2·6		
Japan		2·9	4·6		
French Indo-China		2·5	1·2		
United States		3·7	1·6		
Australia		1·7	1·6		

[1] 48 per cent. of the whole in 1934–35.

in October 1923, and through connection with Bangkok was established a little later. Gradually a railway network, entirely of metre-gauge lines, was developed, especially on the more fertile western side of the peninsula, but a second through line to Siam, touching the east coast, was opened in 1932. A thousand miles of fine metalled roads were also opened, and these permanent benefits to Malaya have not been affected by the subsequent slumps in both mining and rubber planting.

During this economic development the population increased rapidly—especially through Chinese immigration—from approximately 1,450,000 in 1901 to 2,200,000 in 1921 and over 2,700,000 in 1931 (Straits Settlements and Federated Malay States).

The Straits Settlements in particular derive great importance from their favoured situation for local and oceanic shipping.

BRITISH MALAYA

GENERAL EXPORTS

—	Percentages of Total Values.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	Not available	—	*13·7*		
Rice		3·5	2·6		
Copra		2·2	3·8		
Dried fish		1·5	1·9		
Pepper		1·6	1·8		
Pineapples		0·9	1·8		
Raw materials		—	*69·4*		
Para rubber		44·1	35·9		
Tin		19·1	20·1		
Petrol and kerosene		7·3	12·0		
Manufactures		—	*8·6*		
Total value in million S.S. $		*950·5*	*442·1*		
Countries:			1931–34.		
United States		41·6	23·1		
United Kingdom		14·1	12·8		
Dutch East Indies		10·1	8·8		
Japan		4·2	8·2		
India		3·6	2·8		
Siam		2·9	2·6		
Australia		3·1	3·3		
Netherlands		3·6	2·6		
France		3·5	3·3		
Germany		2·0	1·7		
Italy		1·5	1·8		

Rate of exchange: Straits Settlements dollar = 2*s.* 4*d.*

Malacca, captured by the Portuguese (Albuquerque) in 1511, and from them by the Dutch in 1641, was in the sixteenth and seventeenth centuries the chief centre of commerce in the Far East. In 1824 it was ceded by the Dutch to the British. Meantime, however, it had deteriorated as a port by the silting-up of its roadstead, and it was rapidly eclipsed by the port of Singapore, which was founded in 1819, on the island of that name, by Sir Stamford Raffles, who justly estimated the unrivalled advantages of the situation. Singapore is now, therefore, the great *entrepôt* and coaling-station of the Far East. Its harbour allows of ships with a draught up to 36 feet

loading and discharging alongside the quays. There are also large shipbuilding yards and means for efficiently repairing vessels of the largest size and their machinery. There are large tin-smelting works both here and in Province Wellesley. Since the opening of the latter in 1903 Penang, which has an excellent harbour, has become the chief place of export of Perak tin. On the west coast of the mainland Port Swettenham, the former Kuala Klang, in 3° N., is a good port and connected by rail and road with the nearby F.M.S. capital, Kuala Lumpur. At Prai Harbour, opposite Penang Island, large harbour works were undertaken but extensive silting has left most of the trade with Penang.

The trade of the Straits Settlements (mainly of Singapore and Penang) is largely an *entrepôt* trade, hence the appearance of many items both as imports and exports. Official returns now show the combined trade of the whole of British Malaya.

THE EAST INDIES OR THE MALAY ARCHIPELAGO

The group so called embraces all the islands in the south-east of Asia, with the exception of those belonging to China and Japan. New Guinea and the islands immediately adjacent are usually considered as part of Australasia rather than of Asia. The islands are almost entirely in the possession of European Powers, and the greater number belong to the Dutch. To the Dutch belong the Great Sunda Islands of Sumatra, Java, and Celebes, with the greater part of Borneo; all the Lesser Sunda Islands, except the north-east of Timor (which is Portuguese); and theirs also are the Moluccas which lie between Celebes and New Guinea and the western half of New Guinea. As regards commerce Java and Madura are the most important islands of the whole group. The possession of rich volcanic and alluvial soils, combined with facilities for irrigation, confers great natural advantages, and these, together with the efficient system of government pursued by the Dutch, have enabled these islands, though only about equal in area to England exclusive of Wales, and thus containing less than one-fifteenth of the land belonging to the whole archipelago, to support about half the population of the group. The density of the population in the islands exceeds that of England, and the number of the inhabitants is still increasing with great rapidity. The population of Java and Madura in 1880 was under 20,000,000, in 1905, 30,100,000; in 1920, 35,000,000 or 689 to the square mile; in 1930, 41,720,000. Thus, with a population of over 817 to the square mile Java is one of the most densely populated agricultural countries in the world. The great staple product of Java was for long coffee, but, as in Ceylon, this branch of cultivation gave place to that of other tropical products, principally sugar, rubber, tea, oil-palms, tobaccos, and

cinchona. Robusta coffee, of African origin, has replaced other varieties. In 1910 it furnished 11 per cent. of the total coffee crop of the Dutch East Indies ; in 1920, 84 per cent. It is less exacting than other kinds as to soil, climate, and treatment, and less liable to disease. Sugar-cane is especially important in the plains around Sourabaya, the chief eastern port.[1] It is grown as a rotation crop on irrigated land, generally every second year, following rice. Some cinchona plantations (formerly coffee also) belong to the government, and are either cultivated for the government by natives, or are rented by private planters.[2] The dense population of the island causes the land to have a high value, but on the other hand affords abundance of labour. Nowhere in the tropics are science and business capacity more steadily devoted to agriculture, with results that are specially conspicuous in the production of sugar, rubber, and cinchona. The Dutch East Indies have almost a world monopoly in cinchona, kapok, and pepper. There is a considerable output of mineral oil from Java, but less than from Sumatra and Dutch Borneo.

Batavia, on the north coast in the west of Java, is the capital of all the Dutch possessions in the East, and has a trade similar to that of Singapore. Its harbour having, like that of Malacca, become silted up, a new harbour (Tandjong Priok) has been constructed six miles away, which has a depth of 28 feet at ordinary spring-tides. On the hills to the south of Batavia, at the distance of about thirty miles, stands the charmingly situated town of Buitenzorg, a sanatorium for Europeans, and the seat of a palace of the Governor-General of the Dutch East Indies. Besides Tandjong Priok, Samarang and Sourabaya are the main harbours or roadsteads on the north coast available during the wet monsoon (December to March). The south coast has in Chilachap, in about 109° E., the only natural harbour in the island.

The remainder of the Dutch East Indies, that is outside of Java and Madura, are usually called the 'Outer Territories' with an area of 682,000 square miles and a population of only about 20,000,000—a density of only 30 to the square mile—they offer a marked contrast to Java. But whereas Java is fully populated, there is much room for expansion in the Outer Territories and great developments are now taking place. Sumatra is a large island with a backbone of mountains in the west and a plain about 600 miles in length and from 60 to 110 miles in width on the east. This plain is, however, to a large extent marshy and thinly peopled, and the chief commercial product for long was coffee, obtained from

[1] The cultivation of sugar-cane has been badly hit by over-production elsewhere and the drop in the Indian demand. Acreage fell from 500,000 in 1931 to 70,000 in 1935.

[2] Only 3 per cent. of the so-called European agriculture is now government

the slopes of the western mountains. In the north-east, however, round Deli, the soil has proved to be admirably adapted for the cultivation of tobacco, which is hence rapidly extending here and leading to the neglect of this crop in other parts of the Dutch East Indies. Great attention has also been given to tea, the African oil-palm, and to rubber, while important oil-fields have added to the importance

NETHERLANDS INDIES

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926-30.	1931-35.	—	—
Foodstuffs	*24·4*	*22·5*	*23·2*		
Rice (husked)	9·4	3·7	7·0		
Fish	2·7	2·3	3·4		
Raw materials	*6·8*	*8·5*	*7·6*		
Fertilisers	3·2	2·5	1·7		
Manufactures	*68·0*	*66·3*	*65·9*		
Cotton tissues	23·5	16·8	12·9 [1]		
Other tissues	4·1	6·8	8·4 [1]		
Chemicals and drugs	1·6	2·5	4·9 [1]		
Machinery and tools	6·1	8·3	4·7 [1]		
Iron and steel	7·1	7·3	4·6 [1]		
Tobacco, and manufrs. of	5·7	3·8	3·0		
Yarns	1·6	1·3	2·2 [1]		
Total value in million gulden	*678·3*	*909·0*	*358·2*		
Countries:					
Japan and Formosa	9·9	8·4	26·3		
Netherlands	19·5	14·0	14·2		
Singapore	16·2	10·2	11·4		
United Kingdom	14·6	9·6	8·7		
Germany	6·9	7·9	8·0		
United States	6·6	8·1	6·8		
India	5·4	4·6	4·0		
Australia	3·1	2·3	3·3		
China	4·4	1·7	2·1		

[1] Omits 1935.

For value of gulden see under Netherlands.

of the island. The chief ports of Sumatra are Padang on the west coast, Palembang on a navigable river traversing the eastern plains, and Belawan (Deli district) in the north. The Ombilin coal-field in Sumatra, in a mountainous district forty miles east of Padang, yields steam coal of fair quality, and has been connected with the new harbour of Emmahaven, five miles from Padang, by a railway which also serves some fertile and densely peopled valleys in the volcanic area of middle Sumatra. Off the east coast of Sumatra are the

small islands of Banka and Billiton (Belitong) which form a continuation of the tin-bearing belt of Malaya and have a large output of tin ore. The surplus products of Celebes are obtained mainly from the peninsula of Menado in the north-east, where there is a rich volcanic soil, producing much copra and some spices. Macassar, in the south-west of Celebes, has a fine roadstead, and on that

NETHERLANDS INDIES

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*47·3*	*38·3*	*35·5*		
Sugar and molasses	31·8	19·3	13·8		
Tea	6·0	5·8	7·4		
Coffee	4·3	4·4	4·8		
Pepper and cubebs	1·3	2·6	2·9		
Raw materials	*50·1*	*58·5*	*55·4*		
Petroleum oils	10·3	11·0	18·3		
Rubber	12·9	21·0	11·8		
Tobacco	8·0	5·8	7·7		
Tin	2·0	5·5	5·5		
Copra	6·3	6·1	6·3		
Fibres (kapok, agave)	2·3	2·5	3·0		
Manufactures	—	*1·9*	*3·5*		
Total value in million [gulden	*1542·3*	*1482·6*	*540·2*		
Countries:					
Netherlands	19·1	16·4	20·0		
Singapore	17·6	21·3	15·1		
United States	9·5	13·1	12·2		
United Kingdom	7·6	9·0	7·7		
India	9·6	10·2	5·6		
Japan	7·3	4·4	4·6		
Australia	2·8	2·6	4·0		
France	4·8	3·6	3·5		
Hong Kong	7·7	3·1	3·6		
China		3·3	2·4		
Germany	1·5	2·4	2·3		

account, as well as because of the other advantages of its situation, is a place of considerable commercial importance. It gives its name to Macassar oil now used as a basis for cosmetics, formerly for oiling the hair (hence the necessity for antimacassars).

The Moluccas, or Spice Islands, are a group of islands of which the principal are Halmahera or Jilolo, Ternate, Tidore, Bachian, Buru, Ceram, Amboina, and the Banda Islands. They are still noted for the spices, especially cloves and nutmegs, to which they owe their name. Both Amboina and the Banda group lie to the

south of Ceram. The small islands of Ternate and Tidore, to the west of Jilolo, were each formerly the seat of a powerful sultan, and Ternate is still the centre of local trade in these Eastern waters.

Dutch Borneo is still comparatively undeveloped and so are the Dutch portions of Timor and New Guinea. The discovery of oil in Borneo, and also coal, at no great distance from the coast has caused changes. Immense deposits of iron ore exist in Celebes.

BRITISH BORNEO. The whole of northern Borneo is now under British protection. It is made up of a section in the north-east subject to the British North Borneo Company; another, to the south-west, to the native sultan of Brunei; and a third, Saráwak,[1] still further to the south-west, to a rajah of British family. The population of the whole, about three-quarters of a million, consist of the native tribes of the forested and undeveloped interior and the immigrant Chinese and Malays of the coastal strips.

British North Borneo has several safe and commodious natural harbours, though not as many as would appear from the outline on the map, some of the openings being encumbered with coral reefs. Sandakan, the capital, stands on one of the best of these on the north-east coast. Kudat Bay, on the north, also contains an excellent harbour. Coal, mineral oil, and gold are found, but the chief exports are plantation products, timber, and jungle produce. The most important are rubber and tobacco of high quality suited for cigar wrappers. Fine timber and rubber from the native forests, jelutong, sago, rice, gums, coffee, coconuts, pepper and other spices, and gambier are also exported, as well as gutta-percha, rattans, camphor, and a tanning extract derived from a mangrove exported under the name of cutch, though different from the cutch or catechu of Burma. A railway 127 miles long has been laid from Jesselton on Gaya Bay to Melalap in the interior (with a branch to Weston on Brunei Bay). Twelve miles to the south are the famous birds'-nest caves of Gomanton, which yield an important export.

The small island of Labuan to the west of Brunei, formerly a British Crown Colony, was handed over to British North Borneo in 1890 and then transferred to the Straits Settlements in 1906. It has a good port and coal deposits.

Saráwak, in which the river Rejang is navigable by steamers for 160 miles, has similar products to those of Borneo, rubber, pepper, and sago being the chief, but the principal export is now mineral oil from fields worked by the Sarawak Oilfields, Limited, with headquarters at Miri. Its port is Kuching on the Saráwak River, 23 miles from the sea.

Brunei was administered by a British resident on behalf of the native sultan from 1906 to 1931 when the sultan assumed full powers. The chief exports are now mineral oil, rubber, and cutch.

[1] Final *k* is not pronounced.

THE COMMONWEALTH OF THE PHILIPPINES. The Philippine Islands, along with the island of Paláwan and the Sulu Archipelago, belonged till 1898 to Spain, but from that date have been a possession of the United States. When the United States took possession, self-government was promised as soon as the country should be ready to take on the responsibility. Consequently, the Commonwealth came into being in 1935 and a president was elected (with an American high commissioner in place of a governor), and automatically full independence follows in ten years. The islands are volcanic and much subject to destructive earthquakes. The majority of the people inhabit Luzon, which is accordingly the island of chief commercial importance. The commercial products are sugar, copra and coconut oil, Manila hemp, tobacco and cigars. An insect ruined the bulk of the coffee plantations. The extensive sugar plantations are in Luzon, Negros, Cebu, and Leyte, and there are 50 sugar 'centrals' and refineries; there is also a government bureau of investigation for the promotion of the sugar industry. The highland provinces facing the northern part of the west coast of Luzon form an important mineral district rich in gold. Railways run both north and south from Manila, the capital and chief port of the entire group, the northern line going to San Fernando on Lingayen Bay, and passing through the chief hemp and sugar plantations of the island, and the southern sending a branch to the sugar-growing centre of Batangas. The upper part of Manila Bay has, by the construction of a breakwater, been converted into an excellent harbour sheltered against the fiercest typhoons. The population of 13 millions consist mainly of Filipinos, of Malay race, who are Christians and of whom a large proportion speak English. There are numerous Chinese immigrants and the hemp trade is largely controlled by the Japanese. The bulk of the trade, both outward and inward, is with the United States, with which alone there is free trade.

CHINA

This vast country, an ancient empire down to February 1912, when the Manchu dynasty was overthrown and a republic proclaimed, is the only part of the mainland of Asia besides India with a population of high density. In this we see a result of the seasonal rainfall distribution. Though the winter temperatures are cool even in the south, and in the north and most parts of the interior rigorous,[1] the rains, occurring, as in monsoon regions

[1] The mean January temperature at Canton, on the Tropic of Cancer, about 55° F.; at Zikawei (Shanghai), in about 31° N., 37° F.; at Peiping (Peking) in 40° N., 23° F.

generally, during the season of high temperatures, promote an enormous vegetable production. The figures given for the population of China Proper were formerly only vague estimates, and although an accurate census has never been taken all estimates agree in confirming the previously entertained ideas as to the great density of population. The total population of China (excluding Manchuria) was estimated in the Government Gazette of 1911 at 302,000,000 but the Post Office Census of 1925 placed it at 459,000,000. The population is especially dense in most of the eastern plain, which stretches from the mountains in the north of Peiping to those south of the Yangtze Kiang. This plain thus extends, roughly speaking, through ten degrees of latitude, from about 30° to 40° N., and its greatest width is about the parallel of 35°. It extends everywhere to the coast except in Shantung, the province which juts out between the Yellow Sea and the Gulf of Pechili. Another large and densely peopled plain lies on the middle Yangtze and the lower course of its great northern tributary, the Han.

Another region of high density is in the south-east, forming the province of Kwang-tung, which is largely composed of a deltaic alluvial plain ; and in the west there is a third region of exceptionally great density of population, in what is known as the Red Basin, in the east of the province of Szechwan and the north of Yunnan, where, besides great mineral wealth, there is a peculiar red soil of extreme fertility. West of the great plain, China is for the most part elevated and to a large extent mountainous, but even the elevated regions are in some places capable of supporting a numerous population. This is so, for example, in the region of the red soil just referred to. Where that soil is found cultivation can be pursued to a great height up the mountains ; and the Chinese in eastern Szechwan cultivate the hill-sides wherever the slope is not above 30°, which is about the steepest a man can walk up unaided by his hands. To the west of this area an isolated level plain of somewhat more than 2,000 square miles in extent, formed of the bed of an old lake, has been irrigated from the waters of the Min, with the utmost care for upwards of 2,000 years, and everywhere covered with a verdure which would be monotonous were it not for the variety of shades. Towards the south-east of this plain lies the rich and populous city of Chengtu-fu.

The northern half of China is covered, and vast hollows to a great depth filled, with a peculiar yellow soil known as loess, which is also of remarkable fertility, and rewards cultivation even at great heights. This soil is light and easy to work, but it has one great drawback. Its productiveness, though often very great, is very uncertain. The soil is so porous that water runs through it with great rapidity, and crops are thus liable to suffer from drought unless refreshed with frequent showers or supplied with water by

irrigation ; and so it happens that a region which, when rain falls with sufficient frequency, yields the most abundant crops, may in other seasons have its crops entirely destroyed, though the rainfall may have been plentiful enough for soils of another kind. Irrigation, therefore, is practised throughout this region wherever the structure of the ground admits of it, and lands that can be irrigated are in some places of ten or twenty times the value of ' dry ' fields. Many parts of China are, like certain parts of India, pitted with wells like a sieve, every field having one.

Contrasts between N. and S. China. While the general characteristics of a monsoon climate are found throughout China, there are necessarily considerable differences in different parts of a vast country ranging in latitude from about 18° to beyond 41° N. Differences in temperature will be taken for granted, but differences in the distribution of rainfall should also be noted. But in the north and south the average rainfall shows a decided culmination in the middle of summer and is very slight at the extremes of the year, but in the Yangtze valley the summer rains are more prolonged, and while the average maximum here also is in the middle of the year, there is a second period of heavy rains in September and October. Many years ago Baron Richthofen noted the somewhat marked contrasts for the most part directly or indirectly due to climate on opposite sides of the easterly continuation of the Kwenlun Mountains, that is, the Tsinling-shan and the Funiu-shan. North of that line of water-partings lie the great loess deposits described in the last paragraph, and these may be looked upon as the result of climatic influence, inasmuch as they are to be regarded as accumulations of dust brought from inner Asia by the north-west winds of the exceedingly dry winters. Filling up the hollows, these deposits give a remarkably uniform aspect to the surface features, except locally where the deposits are themselves cut by deep vertical-sided gorges. To the south again loess is presented only in isolated patches ; mountains and valleys are fully formed. Loess being unfavourable to tree growth, the mountain slopes are generally bare, whereas in the south they may have luxuriant trees and shrubs as well as innumerable clumps of bamboo, without which, it has been said, it would be difficult to imagine how existence could be sustained, and expansions of the valley bottoms are filled with fertile alluvium densely peopled. The north is the land of wheat, cotton, and pod-fruits, the south that of rice, tea, silk, tung oil,[1] and sugar-cane, In the north are wagon roads, in the south for the most part only narrow foot-paths and tracks for pack animals. In the north mules, horses, asses, and camels are used as beasts of burden, the first two also for draught. In the south asses and camels are unknown, and

[1] A drying oil used for varnishing wood expressed from the seeds of a euphorbiaceous species (*Aleurites cordata*, Thunbg.).

apart from the waterways, human porterage was, until the recent developments, the chief means of transport.

Hitherto China has depended mainly on its agricultural resources, but its mineral wealth is known to be considerable. From the first column of the table on p. 243 it will be seen that the coal-fields of China are estimated to contain a supply of coal of first magnitude. These coal-fields exist in many places where there is already a dense population, and much of the coal is of excellent quality. One coal-field about seventy-five miles north-east of Tientsin has long been worked on the European system, and has been connected by rail with a navigable river. Other small coal-fields exist in the vicinity of Peiping. Other fields containing both bituminous and anthracite coal, both excellent, lie in the west of the mountains of Shantung (now under Japanese control). But the great coal-fields of China lie further in the interior. The southern half of the province of Shansi has enormous deposits both of anthracite and of bituminous coal at the height of between 2,000 and 3,000 feet above sea-level (the loess plateau). The south-east of this province forms one of the most remarkable mineral regions in the world. The anthracite extends over an area of about 13,500 square miles, but true anthracite occurs chiefly in two groups, and most of the deposit is only half-anthracite with from 87 to 89 per cent. of carbon and much ash. While the average aggregate thickness of the coal-seams is at least 40 feet, almost everywhere there is to be seen a seam of from 15 to 20 feet, mostly one from 20 to 30 feet in thickness. So frequently does the productive part of the coal-field crop out on the surface, that along one line about 200 miles in length an opening might be made direct into a seam of great thickness almost anywhere. The stratification seems to be undisturbed, and in many places it is nearly horizontal. Where the seam of from 20 to 30 feet in thickness crops out, with an easterly slope only just sufficient for drainage, into this level adits could be tunnelled for miles to the west, so that once a railway had been constructed to the surface of the plateau the wagons could be run into the mines and loaded with coal for Peiping or Shanghai direct. An outlying portion of this coal-field, known as the Chinghwa coal-field, lies at a lower level on the slope of the plateau in northern Honan. This coal-field is now believed to have 80 per cent. of the resources of China. Smaller fields occur in south-eastern Hunan, eastern Szechwan and northern Yunnan. Szechwan is also rich in salt and iron ore, and Yunnan is remarkably rich in copper, to a less extent in silver, while there are important tin and other mines near Mengtse or Mongtse in the south-east of the province. During the War China became the greatest producer of antimony in the world, the great bulk coming from the province of Hunan. The production of wolfram also increased.

Though the iron ores of Shansi are of very good quality, an have been for hundreds of years the basis of a Chinese iron industr on a small scale, their mode of occurrence mostly in nodules of a fe pounds to a few hundred pounds in weight is not favourable to th development of a large industry of the modern type. Of th numerous deposits of iron ore scattered over China, the best known are the Ta-yeh deposits in Hupeh, but the largest deposits were in Manchuria and China's resources are strictly limited.

The chief thing that has so far hindered the development of these resources is the want of adequate means of communication. Communications throughout the great plain of China are comparatively easy. Inland navigation is carried on by both rivers and canals, and one great canal, 700 miles long, runs through nearly the whole length of the plain. Commencing at Hangchow, at the head of the inlet to the south of the estuary of the Yangtze Kiang, it crosses both that river and the Hwang-ho, and terminates at Tientsin, on the Pei-ho, the inland port of Peiping. It was constructed in the early part of the seventh century, and is still a fine waterway as far as about 35° N., but to the north of that its navigation is much impeded. North of the Hwang-ho, the Pei-ho and its numerous feeders in the plain of Chili or Pechili afford considerable facilities for water-carriage. Navigable rivers facilitate the communication between the great plain and the province of Kwang-tung. Two streams, each navigable nearly to its source, leading on different sides up to an easy mountain pass, called the Meiling Pass, on the northern frontier of the province named, connect the provinces of Kwang-tung and Kiang-si (the route from Canton to Kiukiang); and two others similarly connect Kwang-tung through Hunan with Hupeh (the route from Canton to Hankow).

Between the east and the west of China, however, communication is not so easy. Three great rivers, the Hwang-ho or Yellow River in the north, the Yangtze Kiang in the middle, and Si Kiang or West River in the south, cross the country from west to east, but only the second of these is of great service for navigation. The Hwang-ho, well called 'China's sorrow,' is too rapid, too much obstructed by shallows, and too shifting in its course to be easily navigated. Its navigation is wholly interrupted in the easterly part of its course in northern Honan, and again on the greater part of its course on the western frontier of Shansi, where it plunges through a profound chasm; and, on the other hand, it is liable to cause terrible destruction by sudden changes of its bed in its course through the plain. At certain periods it has entered the sea by a north-easterly course to the Gulf of Pechili, at others by a south-easterly course to the Yellow Sea. By a change of this nature in September 1887 at least one million human beings are estimated to have perished. In January 1889 the river was again brought back to its

previous course by which it entered the Gulf of Pechili. The Yangtze also floods disastrously, as in 1931 ; indeed, the central basins, which were formerly lakes, are converted again into shallow lakes in some years.

The Yangtze Kiang is an admirable watercourse as far as the town of Ichang, in about 111½° E.—that is, for above 1,000 miles from its mouth. Thus far steamers have long ascended, and even ocean-going steamers can reach as high as Hankow, 680 miles up, and there get loaded with tea and other products for Europe and America. Beyond Ichang, however, a series of difficult rapids impede the navigation for about 400 miles ; and as the mountain tracks between Ichang and Chungking, the great river-port of Szechwan, are likewise extremely difficult, that rich province is in a large measure shut off from communication with the great eastern plain. Such commerce as is maintained with this region mostly follows the river route. Till recently it was carried on only in small boats of four or five to about ninety tons, in which the journey up between the ports above-mentioned occupies from three weeks to about fifty days, according to the state of the river, being longest when the river is high. The journey down takes from four to ten days. The packages of goods for this water trade have to be made of sufficiently small size for them to be readily lifted out, as at the most dangerous parts of the rapids the boats may have to be emptied and dragged up. The freight varies according to the commodity, the state of the river and other circumstances, but is necessarily always high, notwithstanding the low wages of Chinese coolies.[1] This obstruction to communication is all the more serious from the fact that the provinces thus shut off from each other are mutually deficient in commodities which the others supply. Rich as the soil of Szechwan is, it is not suited to any great extent for cotton, which in China is mainly grown on the loess. On the other hand, Szechwan is one of the richest of all Chinese provinces in silk, and both it and Yunnan are well adapted for opium. It has already been stated that valuable minerals also abound. Hence it is that, notwithstanding the existence of these obstructions to navigation, the river traffic on this section of the Yangtze Kiang is very active. No fewer than 5,000 boats are estimated to traverse this route each way in the course of the year. Yet, if we take the average cargo at 25 tons, this large traffic represents only about 125,000 tons either way—a small commerce for regions so populous and so much in need of each other's products. Small steamers ascend this part of the river. The first to ascend was a British steamer in 1898, but it

[1] A few years ago the freight for a package of shirtings of about 1½ cwt. was given at from 10*s.* 8*d.* to 12*s.*, or more than 4*d.* per ton per mile, more recently for cotton piece-goods it was given at the equivalent of about 2*d.* per ton per mile.

was intended for local traffic on one of the navigable rivers of Szechwan above Chungking. Early in 1910 a powerful tug steamer with flat bottom specially built in the United Kingdom to the order of a Chinese firm began to run on this stretch. Steamer traffic has since been continued on a small scale, and the great losses occurring in connection with the junk traffic, estimated to have amounted in 1919 to 60 per cent. of the cargo, are inducing the Chinese to order more of such steamers. The most important tributaries of the Yangtze in Szechwan are the Kialing or Siao-ho, which joins the Yangtze from the north at Chungking, and the Min, which has a navigable branch connecting the Yangtze with Chengtu.

The third of the great rivers above mentioned, the Si Kiang, is navigable more or less for the greater part of its course, but rapids impede the navigation at many places. These hindrances, however, are not of the same consequence commercially as those which occur in the course of the Yangtze Kiang.

But even at their worst the rivers of China are better than other means of inland communication. Clumsy carts are used in the north, but in the south there are, or were till very recently, comparatively few roads fit for wheeled vehicles. In general, the cost of land carriage by any method before the War was upwards of 6*d.* per ton per mile, or about twenty to forty times as great as on a river of easy navigation, a cost which must obviously confine to narrow limits the amount of traffic in bulky commodities. The invention of the motor-boat was one of peculiar importance for China, rendering it possible to reach with tolerable rapidity higher reaches of the rivers than before. But the modern means both of production and of transport were till recently regarded by the Chinese authorities with noted dislike, chiefly, it would appear, from dread, partly from contempt of the foreigner. All schemes for the extension of foreign trade in China had to overcome the resistance arising from this dislike, and special difficulties in doing so had to be encountered in consequence of the peculiar character of the Chinese government, which may probably be regarded as in a large measure the result of the remarkable geographical isolation of the country.

Surrounded on the land side almost completely by mountains and highlands difficult to traverse and scantily peopled, China has had a separate history from all the rest of the world. It developed a government which proved for many centuries well adapted to its own circumstances, but not adapted to the maintenance of well-defined relations with foreign countries which might claim to stand on an equal footing. A central government claimed authority over the whole, but Chinese life went on to a large extent independently of this central government. Chinese dynasties have changed again and again, but Chinese life remained the same. There is

apparently no country in the world in which a central authority was so much restricted by the customs and traditions of local government and local feeling. It has thus often happened that the central government in treating with foreign Powers has entered into engagements which it is unable to make good against the passive resistance of the people. 'China,' it has been said, 'occupies the unique position of a state resting on moral force.'

Another difficulty arose from the mode in which the government officials were appointed. All offices were conferred (at least nominally) on successful candidates in examinations, but in fact great expenses were nearly always incurred before appointments were obtained, and the salaries of the offices were generally inadequate at once to meet the expenses of living and to recoup the holders of office for the outlay previously incurred. Of such conditions, corruption on the part of the great body of the office-holders was always and everywhere the inevitable result. Illegal exactions on their part were generally winked at. Formerly this was a recognised moderate and tolerable evil, but intercourse with foreigners, raising in many cases the ambitions and increasing the expenses of the officials, made it intolerable.

But in spite of all obstacles the irresistible pressure of circumstances gradually forced changes both in the governing classes and on the people generally. The needs of the central government favoured the adoption of the telegraph, and the establishment of arsenals provided with modern means for the manufacture of munitions of war in different parts of the empire. At first the official feeling was strongly opposed to railways. The first railway in China was a short line from Shanghai to its outport Woosung, opened in 1876, but it was purchased by the Viceroy of the province and torn up in the following year. Afterwards a railway was laid from the Kaiping collieries east of Peiping to the mouth of the Pei-ho, and at a later date from this latter point to Tientsin. The continuation of the Kaiping line north-eastwards to Manchuria was afterwards encouraged by the government for strategic purposes. In 1897 Tientsin was connected by rail with Peiping. Railway development in China has been complicated by the system of 'Spheres of Influence,' under which certain foreign Powers claimed special rights in certain sections of the country, and this policy has not only tended to produce international friction but has also proved an insurmountable obstacle to the creation of a unified national system. The average operating costs of Chinese railways in 1920 amounted to about 44 per cent. of the revenue, as against 52 in India and Japan, and 60 to 70 in Europe and America. Under an agreement concluded in 1920 the United Kingdom, the United States, France, and Japan are to have equal shares in loans to China for the developing of railways and other means of transport. It was not

until 1936 that Canton and South China were linked by railway with Hankow and Central China.

As soon as introduced both telegraphs and railways have always been eagerly made use of by the people. Commercial competition has led to the adoption of other European inventions. The increasing production of silk in Europe and Japan induced Chinese producers to adopt silk-filatures, and the competition of India and Ceylon in tea has caused some Chinese growers to introduce leaf-rolling machinery. Cotton-mills equipped with the latest machinery and conveniences have been erected at Shanghai, Hangchow, Ningpo, Wenchow, Wusih, and elsewhere. In 1911 the number of mill spindles in China was 832,000; in 1920, 2,225,000—a competition very keenly felt by Japan, whose capitalists are taking advantage of the more favourable conditions for spinning coarse yarns in China by setting up factories there. According to the list of mills given in the China Year Book, 1934, there were 5,382,000 spindles in China, a number which continues to increase. Wusih, situated on the Shanghai-Nanking railway, not far from Suchow, long an important seat of silk manufactures, may now be described as the industrial capital of Kiangsu. Extensive iron and steel works have been established at Hanyang; great shipbuilding yards at Shanghai. The demand for machinery, including electrical machinery, is growing rapidly. The lack of roads—so marked a feature of southern China—is being made good, at least near the great cities, where there is an increasing demand for automobiles. Motor-buses ply as soon as there are roads. Many cities, formerly taking months to reach, are now accessible by regular air routes. Chinese students are making themselves acquainted with western science and learning in Europe, America, and Japan, as well as at colleges in their own country (such as the Nanyang college at Shanghai, one at Tientsin, and the Shansi Imperial University founded in 1900), and an active and widespread native press is tending to bring about the same result.

Increased facilities for commerce were given in 1898 by throwing open the navigation of the inland waters of China to foreign vessels, though the value of this concession was greatly diminished by the harassing regulations afterwards issued. In 1902 an important treaty was concluded between China and Great Britain, by one provision in which it was hoped that the internal customs duties on foreign goods known as *likin* and by other names, then levied at numerous inland barriers, would be entirely abolished.

Likin remained as a great hindrance to trade till abolished, at least nominally, by the National Government in 1931. A great hindrance to trade in China was the unparalleled confusion in weights, measures, and currency, the standards varying not only from province to province but even from one city to another. For

long the tael, a silver unit of weight, was adopted in currency calculations though not minted. In 1933 the silver dollar, of a certain fineness, was adopted as the national unit, and monetary reforms in 1935 were followed by the issue of coins of smaller denominations in 1936.

It is probably safe to say that there is no country in the world in which the consequences of westernisation are more marked and more momentous than in China. Since the advent of the Republic age old customs, such as the wearing of the pigtail, have disappeared, and the family system, formerly the essential structure of the nation, is fading. The Chinese are intelligent, hard working, peace-loving, and with a very high standard of business integrity and loyalty. The development of a great modern Power is only a matter of time. At present it is possible to divide China into three economic zones. The first zone is that of the treaty-ports, open to foreigners, where one finds huge western buildings and where, indeed, the whole life is governed by western ideas. Examples are found in Shanghai and Peiping as well as in Canton and Hankow. The second zone is that accessible from the great navigable waterways, from railways and motor roads and where accordingly western ideas are rapidly penetrating. The third zone is that still largely inaccessible from modern routeways but where the motor-bus and the aeroplane are penetrating rapidly.

Until recently all the foreign trade of China took place through the treaty-ports, and like that of India is nearly all sea-borne. The bulk of the traffic is through Shanghai, Canton, Tientsin, and a few ports along the south-east coast. From the south a large part of the trade used to pass through Hong Kong, which with its million inhabitants was a safe home for wealthy Chinese merchants who rather feared the conditions in their own country. As conditions in China improve, Hong Kong is losing and is likely to lose a good deal of its old significance. Many years ago tea was one of the leading exports of China, but the China type of tea can now be produced and is produced in India, and as a leading export its place has been taken by raw silk. It is indicative of the growing industrialisation of China that cotton yarn and cotton goods come almost second amongst the exports, together with some raw cotton, eggs, silk goods and certain miscellaneous raw materials and copper. A few years ago the requirements of the country were manufactures, cotton goods, machinery, &c., and such raw materials as oil. The position has changed; China now figures as a very considerable importer of foodstuffs, of rice, of wheat, as well as of petrol for her new motor-bus services and cotton for her mills. But Japan has a very considerable influence over the foreign trade of China; this is indicated by the fact that Japan figures as the first among her trading associates, followed by the British Empire, including Great

Britain and Hong Kong in particular, and then by the United States with its market for silk and to a less extent for tea. There is no question that China within the near future will figure more largely in world trade. A nation of 400 million people, with a growing national consciousness, with leaders alive for the reform of such things as the currency and systems of communication, must experience the spread among the people of a desire for a higher standard of living according to western ideas, and a larger demand for food. As a market, the possibilities of China are at present immeasurable. It is to the advantage of the nations of western Europe and of North America to realise that China must be encouraged to stabilise her own affairs and to appreciate the higher standard of living which will increase her demands.

The **treaty-ports** were the sole places at which foreign merchants were allowed to reside and own property, and foreign vessels allowed to load and discharge. They now include all the chief seaports of China and most of the principal river ports, and a few inland places. The seaports are most numerous on the south-east coast of China, where the numerous indentations form a number of excellent harbours, though the mountainous character of this part of the country greatly limits their hinterland. The most important in the order from north to south are Hangchow, Ningpo, Wenchow, Foochow, Amoy, and Swatow. Canton is not included here—as having a situation of a different kind. By far the most important of the Treaty ports is Shanghai, the great port of the Yangtze Kiang, the most extensive and productive natural region of China. Its importance is increased by the great lack of seaports in the part of China lying north of the Yangtze, the coastline there being mostly low and uniform, like that on the east of the Indian peninsula. The mountainous Shantung peninsula is indeed more favoured, but the harbours there are too far from any important hinterland to acquire any great trade with the imperfect communications at present in existence. In consequence of these conditions Shanghai serves as the great *entrepôt*, not only for the other Yangtze ports, the chief of which are Chinkiang, Nanking, Kiukiang, Hankow, Ichang, and Chungking, but for all northern China. Shanghai lies, however, not on the Yangtze itself but on a small tributary known as the Woosung or Hwang-pu, at the mouth of which is a bar which prevented vessels of more than 24-feet draught from reaching Shanghai even at high-water spring-tides until the river was canalised in 1906. The largest liners traversing the Pacific, including those of the Canadian Pacific Co., now berth alongside the wharves at Shanghai. The port is provided with excellent graving docks, foundries, forges, machine-shops and engine-works, and shipbuilding yards under European management. Nanking, the capital of the Republic since 1928, is essentially a Chinese town. It has the advantages of

the central position of Shanghai without the dominance of western buildings and institutions. Most of the river ports of the Yangtze have their importance determined at present by the extent and productiveness of the hinterlands opened up by waterways, and from the structure of the country it is probable that the introduction of railways will not greatly alter their relative rank. Chinkiang derives considerable importance from its situation near the junction of the Imperial Canal. But no river port has, or can have, the importance of Hankow, at which the waterways of western China converge in such a manner as to make it the inlet and outlet of Hunan, Szechwan, Kweichow, the greater part of Hupeh, as well as of southern Shensi. Hankow, which suffered greatly in the rebellion of 1911, is only one, and not the largest, of three adjacent towns separated by rivers. Hankow is on the left bank of both the Yangtze and the Han, Hanyang on the right, and Wuchang opposite, both on the Yangtze. The aggregate population of the three towns is variously estimated at from 1,000,000 to 2,000,000. The railways, it will be observed, tend to confirm the importance of this situation. It is unquestionably the advantages of situation just pointed out that caused Hanyang to be selected as the site of the first great iron and steel works erected in China, although the materials of the industry have to be brought from a distance; iron from Ta-yeh, fifty miles away, about fifteen miles from the right bank of the Yangtze, and coke from mines at Ping-hsiang in Kiang-si, 300 miles distant, where manganese ore is also obtained. The Ta-yeh ores are of excellent quality, above 60 per cent. of iron and from 0·05 to 0·25 of phosphorus. Besides large blast-furnaces, the works include rolling-mills which produce steel rails and other articles for home consumption. Much of the pig-iron is exported to Japan, and some has even been exported to both New York and San Francisco. Owing to several difficulties in operation, the works were shut down temporarily in 1922. Shasi or Shashi, one of the treaty-ports opened in 1896, about midway between Hankow and Ichang, has the advantage of two important canal connections. One canal runs thence eastwards to the lower Han, thus avoiding a great bend of the Yangtze. The other starts from the point of the river Yangtze opposite, and leads to the Tungting Lake in Hunan. Shasi has thus long been the centre of an enormous traffic in native junks, and as the neighbouring country is the most important cotton-weaving district in China the cottons are collected, graded, and shipped at Shasi in large quantity. Chinwangtao, on the Gulf of Pechili, is the port of the Kailan Mining Administration, a Brito-Chinese undertaking which in 1919 produced about 4,000,000 out of the total of about 13,000,000 tons of coal estimated to have been produced in that year by modern methods. In 1933 the modern Fushun and Kailan mines produced 11,000,000 tons out of a total for the country of 27,000,000.

Of the southern seaports the most important is Canton, with a situation analogous, on the one hand, to that of Calcutta on one of the most productive of tropical deltas, and, on the other hand, to that of Venice, its internal traffic being carried on by waterways now threaded by numerous motor-boats. The narrow streets of the old heart of the city are still 'without a wheel or a beast of burden,' though wide roads replace the old walls, encircle the city and penetrate it in several directions. Over Calcutta Canton has the advantage of better communications by water in different directions, but it suffers from the great disadvantage of not being accessible to ocean ships of such large size as those which can reach Calcutta. All vessels drawing more than 16 feet have to lighten at Whampoa, fourteen miles below the port. The improvements carried out recently and the growth of railways in several directions have adversely affected the development of the trade of Hong Kong, although this latter port will still continue to be the most convenient *entrepôt* for many of the numerous ports of the south-east coast with small hinterlands limited by as yet unrailed mountains. Of the northern treaty-ports, Taku, the port of Peiping, has a bar that prevents the access of vessels drawing more than 18 feet even at the highest spring-tides, and Tientsin, though the river has been improved by dredging, can be reached only by coasting steamers. The importance of this place is due to the traffic on inland waterways. The same is true of Hangchow, the great silk-manufacturing town to the south-west of Shanghai. The bay on which it appears to stand can be navigated to its head only by small vessels, and the town is cut off from this bay by an embankment to protect it from the violent bores which ascend the bay at spring-tides. Suchow, situated on Lake Tai-hu and the Grand Canal, also depends largely on water traffic, though it now stands also on the railway connecting Shanghai with Chinkiang, Nanking, and northern China. It no longer has the extent, populousness, or brilliance of Marco Polo's Suju, having suffered very greatly in the T'ai P'ing rebellion, but is still an important town. Of the inland treaty-ports near the southern frontier—all small towns—Lung-chow and Mengtse have been opened to facilitate trade with Tongking, Sumao or Szemao with Siam, and Momein or Tengyueh with Burma.

Peiping, formerly Peking, the old capital of the Chinese Empire, occupies a site of strategic importance with respect to the routes leading into China Proper by Kalgan on the north-west and by the coast round the mountains on the north-east, but is situated on a plain far from productive, and consequently has a relatively small population. Sian-fu, the capital of Shensi, near the right or south bank of the Wei-ho (tributary of the Hwang-ho), occupies a plain of much greater productiveness, and lies in a situation which makes it an important centre of convergence of the trade routes of China.

It is, however, cut off from central China by mountains, across which the lowest pass is about 4,000 feet in height, which makes it doubtful whether future railway connections will follow the present route across these mountains. Of the inland towns of the Yangtze basin not treaty-ports, the most important are Siangtan and Chengtu. Siangtan in Hunan is even more populous than Changsha, the capital of the province, situated lower down on the Siang-kiang. Various schemes have been urged for getting access to the province of Szechwan by rail from Indo-China, but the routes are all extremely difficult. In this region a broken plateau, nearly conterminous with Yunnan and western Kweichow, 'having an average height of about 5,000 feet, and no communication by water with the plains that encompass it on the north, south, and east,' a plateau so broken as to have 'no level surface whatever, except an occasional lake basin,' extends for ten degrees of longitude between Indo-China and the Yangtze Kiang. In these regions the three best routes have been examined by Europeans and declared virtually impracticable for railways, and there seems little probability that any one of them will be able to compete with a railway in the valley of the Yangtze Kiang.

Reference has already been made to the early relations of China with the West. In modern times the Portuguese were the first to establish direct trade relations with this country. This trade began in 1518, but encountered much hostility on the part of the Chinese. In 1557, however, they were allowed to settle on the island of Macao at the mouth of the Canton River, and in 1586 this island was definitely ceded to them in return for assistance rendered to the Chinese in putting down piracy. Both Portuguese and other foreigners were allowed to carry on trade at Canton, but under no formal treaty with the Chinese government before 1842. In course of time a large trade in opium grew up between India and China. This trade was contraband, and though the East India Company caused the opium to be grown expressly for the China market, it left to independent shippers the responsibility of introducing it into China. It was introduced by smuggling, which was corruptly connived at by Chinese officials. This state of affairs was bound to lead to disputes, and ultimately it led to a war between China and Great Britain, at the end of which the five ports of Canton, Amoy, Foochow, Ningpo, and Shanghai were opened as the first treaty-ports, and the island of Hong Kong, to the east of the entrance to the Canton River, was ceded to the British. The opium trade was still declared to be contraband, and another war broke out in 1857, at the conclusion of which it was for the first time legalised. The British Government in India, recognising the nefarious character of the opium trade, determined to suppress it, although it meant the sacrifice of an annual revenue of between £3,000,000 and £4,000,000.

CHINA[1]

SPECIAL[2] IMPORTS,[3] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '91–95	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'25–29
1. Cotton manufactures	10·09	18·68	18·94	23·01	25·61	34·0	38·9	30·9	31·1	15·4
Yarn and thread	*4·08*	*8·39*	*8·56*	*8·95*	*3·48*	*13·7*	*17·5*	*14·0*	*12·1*	*2·1*
2. Opium	5·85	5·14	5·33	6·98	0·11	19·9	10·8	8·9	9·4	0·1
3. Sugar and candy	1·03	2·56	3·67	4·03	13·28	3·8	5·4	6·0	5·5	8·0
4. Rice	1·91	1·51	3·45	2·35	11·48	6·7	3·1	5·7	3·2	6·9
5. Kerosene	1·14	2·47	2·98	4·13	8·53	3·9	5·1	5·0	5·6	5·1
6. Metals, all kinds	1·43	2·95	2·85	3·34	8·52	4·8	6·1	4·7	4·5	5·1
7. Fish, &c.	0·57	0·77	1·21	1·64	3·20	2·0	1·6	2·0	2·2	1·9
8. Coal and coke	0·47	1·06	1·20	1·26	3·53	1·6	2·2	2·0	1·7	2·1
9. Machinery	0·22	0·35	1·02	0·88	2·79	0·8	0·7	1·7	1·2	1·7
10. Flour	0·18	0·53	1·01	1·49	4·66	0·6	1·1	1·6	2·0	2·8
11. Wool yarn and manufrs.	0·86	0·67	0·90	0·95	5·57	2·8	1·4	1·5	1·3	3·3
12. Cigarettes	—	0·42	0·83	1·41	3·02	—	0·9	1·4	1·9	1·8
13. Matches	0·31	0·59	0·75	0·91	0·33	1·1	1·2	1·2	1·2	0·2
14. Timber	0·21	0·23	0·72	0·61	2·48	0·7	0·7	1·2	0·8	1·5
Average total value	29·23	48·09	60·89	73·93	166·32					

Principal Countries.	Percentages. '91–95	'01–05	'06–10	'11–13	'25–29
1. Hong Kong	50·4	38·6	35·6	30·8	17·0
2. United Kingdom	19·5	16·7	16·9	17·2	9·2
3. Japan, including Formosa from 1895	6·0	13·1	14·2	19·2	28·1
4. India	10·4	9·3	8·3	8·7	4·9
5. United States	4·3	10·6	8·3	7·4	16·5
6. Europe, ex. Rus. and U.K.	3·6	6·4	8·0	8·9	—
Germany	—	—	*3·9*	*4·7*	*4·2*
Belgium	—	—	*2·5*	*2·3*	*1·4*
7. Russia	0·6	0·8	1·9	4·0	1·9
8. Dutch East Indies	0·0	0·9	1·4	0·9	3·6
9. Macao	2·1	0·7	1·4	1·3	0·5
10. Straits Settlements	1·4	1·1	1·4	1·7	1·0
11. French Indo-China	0·5	0·4	1·2	0·8	—
Average total value	29·89	49·69	62·97	73·93	168·97

SPECIAL EXPORTS,[4] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '91–95	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'25–29
1. Silk	8·00	10·99	12·47	13·95	26·56	34·9	34·1	28·9	24·9	19·4
Steam filature from 1894	*1·10*	*3·98*	*5·15*	*5·67*	*14·99*	—	*11·9*	*13·4*	*10·1*	*10·9*
Piece-goods	*1·60*	*1·55*	*2·06*	*2·59*	*3·72*	*7·1*	*5·2*	*4·8*	*4·6*	*2·7*
2. Tea	5·94	3·45	4·62	5·13	4·58	25·7	11·5	10·7	9·1	3·3
3. Beans and bean-cake	0·30	1·56	3·70	6·99	25·18	1·3	5·2	9·0	12·5	18·4
4. Raw cotton	1·26	1·91	2·34	2·68	5·11	5·7	6·4	5·4	4·8	3·7
5. Furs and manufactures	0·29	0·90	1·16	1·04[5]	—	1·3	3·0	2·7	1·7[5]	—
6. Straw braid	0·43	0·63	1·13	1·11	2·89	1·9	2·1	2·6	2·0	2·1
7. Hides	0·15	0·76	1·11	1·81	3·00	0·7	2·5	2·6	3·3	2·2
8. Vegetable oil and seeds	0·12	0·49	0·96	1·91	10·14	0·6	1·6	2·3	3·4	7·4
9. Provisions, vegetables	0·17	0·37	0·81	1·79	—	0·7	1·2	1·9	3·2	—
10. Wool	0·32	0·55	0·79	1·00	2·54	1·4	1·8	1·8	1·8	1·9
11. Matting mats	0·31	0·59	0·64	0·62	—	1·3	2·0	1·5	1·2	—
12. Firecrackers	0·26	0·33	0·58	0·48	—	1·2	1·1	1·3	0·9	—
Average total value	22·81	29·97	42·82	56·09	136·92					

Principal Countries.	Percentages. '91–95	'01–05	'06–10	'11–13	'25–29
1. Hong Kong	39·3	38·6	31·9	28·1	16·0
2. Europe, ex. Rus. and U.K.	14·9	17·3	29·9	21·1	—
France	—	—	*11·0*	*10·3*	*6·8*
Germany	—	—	*2·7*	*3·9*	*2·1*
Belgium	—	—	*1·5*	*1·7*	*0·4*
3. Japan	8·0	14·0	14·9	15·8	23·9
4. Russia	9·6	4·5	10·1	12·2	7·2
5. United States	10·7	10·8	9·4	9·2	15·0
6. United Kingdom	9·8	5·8	5·1	4·3	6·4
7. Macao	1·5	2·3	1·5	1·2	0·4
8. Straits Settlements	1·4	1·6	1·5	1·7	2·7
9. India	1·9	1·2	1·2	1·7	1·9

Rate of Conversion of the Haikwan or Customs tael (in pence).

Years.	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.
1890 +	62¼	59	52¼	47¼	38⅝	39¼	40	35¾	34¾	36⅛
1900 +	37¼	35 9/16	31·2	31¾	34·4	36·1	39½	39	32	31 3/16
1910 +	32 5/16	32¼	36⅜	36¼	32¾	31⅜	39 13/16	51 13/16	63 7/16	76
1920 +	81½	47 7/16	45	41¾	43 13/16	41⅞	37⅜	33 13/16	35⅛	—

The tael was abolished in April 1933 and replaced by the silver dollar or yuan (nominally 25*d.*; 1936 averaged 14·5*d.*).

[1] Exclusive of Hong Kong. Average rate of exchange for 1925–29: £1 sterling = 6·67 Haikwan taels.
[2] General imports for countries. The export of eggs in 1925–29 was valued at £6·00 millions.
[3] Values based on 'market values' in Chinese port, including import duty prior to 1904, c.i.f. values from 1904.
[4] Values based on 'market values' in Chinese port, excluding import duty prior to 1904, f.o.b. values from 1904.
[5] Represents average of *two* years 1911, 1912.

Opium is now supplied by the Indian Government to foreign governments only at their direct request, and even then only in quantities commensurate with medicinal uses. In 1898 the Germans demanded and obtained the cession on lease of the harbour of Kiaochow, with a small district round it on the south side of the Shantung

CHINA

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*22·5*	*15·0*		
Rice	6·2	7·6	8·7		
Wheat	1·7	1·1	4·9		
Sugar	7·5	7·5	4·1		
Tobacco	2·7	2·4	2·3		
Flour	3·0	2·8	1·8		
Raw materials	—	*25·3*	*18·1*		
Cotton (raw)	4·8	7·9	8·9		
Mineral oils	5·7	6·0	8·5		
Iron and steel	3·0	3·1	6·0		
Chemicals	2·8	2·6	3·6		
Tobacco	2·7	2·4	2·3		
Manufactures	—	*44·5*	*23·6*		
Cotton manufactures	17·0	13·8	5·1		
Machinery	2·3	3·0	4·4		
Paper and cardboard	2·0	2·1	3·3		
Wool manufactures	2·8	2·7	2·6		
Total value in 1,000 million taels	*1·01*	*1·18*	*1·04*		
Countries:					
United States	18·4	17·0	22·9		
Japan	22·6	26·8	14·5		
United Kingdom	12·1	8·9	10·7		
Germany	3·7	4·6	8·1		
Hong Kong	23·5	16·7	5·9		
India	3·7	5·8	5·1		
Netherlands Indies	2·0	3·5	4·6		
Belgium	1·8	1·6	2·1		

1 tael = 1·558 of the new standard dollar.
Rate of exchange approximately \$1·00 = 14*d*.

Peninsula; and this was followed by similar cessions to Russia of Port Arthur and the anchorage of Talienwan in Manchuria, to France of Kwang-chau-wan on the peninsula opposite the island of Hainan, and to Great Britain of Wei-hai-wei on the north side of the peninsula of Shantung. At the same time an addition was made to the Kaulun or Kowloon territory belonging to Hong Kong on the opposite part of the mainland. At the treaty-ports the

collection of the customs duties on behalf of the central government of China has long been in the hands of a foreign board called the Imperial Maritime Customs, presided over by an Englishman—a situation curiously analogous to that of the Staplers in past times

CHINA

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	*34·5*	*12·4*		
Oils [1]	6·1	5·6	6·2		
Beans	9·9	12·5	5·6		
Tea	2·8	3·3	5·1		
Egg albumen and yolk	2·2	3·8	4·6		
Ground nuts	2·8	1·8	3·1		
Millet and kao-liang	2·1	2·9	1·1		
Raw materials	—	*46·2*	*24·8*		
Raw silk	15·6	15·5	7·8		
„ cotton	5·2	3·6	3·7		
Metals and ores	2·4	3·2	4·9		
Oil-seeds	0·8	2·4	3·1		
Bean-cake	6·6	6·2	2·7		
Coal	2·7	2·9	1·8		
Manufactures	—	*16·1*	*12·3*		
Cotton goods	2·6	3·5	6·9		
Silk goods	2·9	2·6	2·9		
Other textiles	—	3·6	7·3		
Total value in 1,000 million taels	*0·77*	*0·90*	*0·77*		
Countries:					
Japan	26·0	24·0	19·8		
Hong Kong	22·6	16·7	17·9		
United States	13·3	14·2	16·9		
United Kingdom	6·4	6·6	8·0		
France	5·7	6·1	4·5		
India	1·5	1·9	3·7		
Germany	2·0	2·3	4·1		
Korea	4·2	5·2	3·0		
Russia	6·0	7·3	2·7		
Singapore (after 1930, British Malaya)	2·5	2·5	2·2		

[1] Mainly of wood and bean oil.

in the trade of England. At the close of the Russo-Japanese War in 1905 China was obliged to cede to Japan all the rights that had been acquired by Russia in Manchuria, and in 1915 during the Great War it had to make a similar concession of the rights acquired by Germany in Shantung. The concession was returned by Japan to

China in 1922, since when the port has been allowed to deteriorate seriously. Kiaochow Bay, in the south of Shantung, though shallow in its upper parts, has a good harbour at Tsingtao or Chingtao at its mouth. The growth of Japanese interests in North China have thus been gradual. In 1932 the independent state of Manchukuo (Manchuria) was created under Japanese influence. The British gave up Wei-hai-Wei, and foreign 'Treaty Powers' are tending gradually to relinquish their treaty rights as the Central Government at Nanking becomes stronger.

HONG KONG. After its cession to Great Britain **Hong Kong** in 1841 became the great *entrepôt* for southern China, and nearly all the direct foreign trade with that country tended more and more to become concentrated there and at Shanghai. The deep and commodious inner anchorage at Victoria Bay on the north side of the island makes it the port for all large ocean-going ships in connection with the trade of Canton. It has grown into a great centre of western industry and enterprise, the seat of a great Chinese University, of great shipbuilding yards, and a variety of manufactures. The stability of life under a British government attracted a very large number of Chinese merchants, but as conditions in Canton and South China improve so the trade is likely to move.

MANCHURIA or MANCHUKUO. China Proper is bordered on the north-east, north, and west by various territories formerly part of the Chinese Empire. **Manchuria** is the most important of these. It lies to the north-east, and is the country from which the last Chinese imperial dynasty originally came (in 1644). It has mountainous country in the east and west, the eastern mountains being rich in places in coal and iron. The intervening country, mostly level and to a large extent extremely fertile, is drained partly by the Liao-ho into the Gulf of Pechili, partly by the Sungari with its tributary the Nonni into the Amur—all fine navigable streams. Chinese settlers have long been flocking into it, and the railways running through it, originally constructed by the Russians, hastened on this movement so that over 30,000,000 Chinese inhabit its fertile plains. The most remarkable feature of its trade has been the rapid growth of the export of soya-beans principally to Japan, but also to Europe and America. The new towns which grew up along the railways under Russian auspices are all solidly built and provided with the latest conveniences of European cities. The most important of these is the new Harbin (a short distance from the old town of that name), situated where the railways diverge for Vladivostok and Port Arthur and Dairen, 'in a country as rich as Manitoba, with coal measures not far distant and forests near by.' Dairen (formerly Dalny), at first a free port established by Russia in the leased territory adjoining Port Arthur, in 1903 was placed under the Imperial Maritime Customs, but since 1905 has been under Japanese control.

Besides the great iron and steel works already mentioned it has large oil-mills crushing soya and other seeds. Enormous development followed the granting to Japan of the concession to build the South Manchuria Railway. Since the establishment of the State of Manchukuo under an hereditary Emperor of Japanese choosing Russian influence has been eliminated. Amongst the fine modern cities is Moukden. There is a large production of coal from Fushun near Moukden. The capital is Hsinking.

MONGOLIA. Mongolia, west of Manchuria, is a tableland occupied mainly by pastoral tribes, surrounding the desert of Gobi. By an agreement concluded with Russia in November 1913 what is called Outer Mongolia, that is, the districts as yet undelimited under the jurisdiction of the Chinese Amban of Urga, the Tatar general at Uliasutai, and the Chinese Amban of Kobdo, while recognised by Russia as still under the suzerainty of China, has been declared autonomous and completely withdrawn from Chinese control. This was confirmed by the Sino-Russian Treaty of May 1924. In general it may be said that Outer Mongolia is under Russian control, while part of Inner Mongolia has been annexed to Manchukuo.

SINKIANG. Chinese or Eastern Turkestan occupies the basin of the Tarim, and is separated from Mongolia by part of the Chinese province of Kansu. It also is a tableland with a desert in the interior, but the oases at the base of the mountains which enclose the tableland are highly cultivated. The region has been so vividly described by Sir Francis Younghusband that no apology is needed for quoting his words : ' If you could get a bird's-eye view of Chinese Turkistan,' he says, ' you would see a great bare desert surrounded on three sides by barren mountains, and at their bases you would see some vivid green spots, showing out sharp and distinct like blots of green paint dropped on to a sepia picture. In the western end, round Kashgar and Yarkand, the cultivation is of greater extent and more continuous than in the eastern half, where the oases are small and separated from each other by fifteen or twenty miles of desert. These oases are, however, extraordinarily fertile ; every scrap of land that can be cultivated is used up, and every drop of water is drained off from the stream and used for irrigation.' The height of the oases above sea-level is somewhat more than 4,000 feet.

Kashgar and Yarkand still maintain a caravan trade with China, and they are the centres of the trade carried on across the passes of the Pamir—a trade which was very valuable at the time when silk and other Chinese commodities were conveyed by that route to Europe.

TIBET. Tibet, a lofty tableland, or series of tablelands, traversed by mountains, and bounded on the south by the Himalayas, is very scantily inhabited, and most of the inhabitants are confined to the

valley of the Brahmaputra (Sanpo). Since the revolution in China the claim of the Chinese government to the allegiance of Tibet has become very shadowy. The actual ruler is the Grand Lama, the head of a peculiar form of the Buddhist religion. He resides at Lhasa, a town about 12,000 feet above sea-level. The country produces fine wool, including cashmere wool. In 1894 foreigners were allowed to advance as far as Yatung to the north of the Himalayan state of Sikkim for trade, but the trade with British India is nevertheless still small, Tibet continuing to derive the bulk of the tea it consumes in the form of brick-tea by difficult routes from western Szechwan.

TOWNS OF CHINA AND MANCHURIA (ESTIMATES)

China.	
Shanghai (Greater)	3,259,000
Tientsin	1,387,000
Peiping	1,298,000
Nanking	1,013,000
Canton	861,000
Hankow	778,000
Chungking	635,000
Changsha	607,000
Hangchow	506,000
Tsingtao	390,000
Manchuria, 1935.	
Moukden	500,000
Harbin	482,000
Dairen	283,000
Hsinking	230,000

JAPAN OR NIPPON

Japan is an insular empire embracing all the islands off the east coast of Asia, between the Philippines in the south and the peninsula of Kamchatka in the north. In 1910 Japan annexed the large peninsula of Chosen (Korea) on the mainland of Asia and in 1931–32 assumed paramount influence in Manchuria. It thus includes Formosa (Japanese, Taiwan) (ceded by China in 1895), the Riu-kiu (Lu-chu) or Okinawa and Bonin islands in the south, and Hokkaido (Yezo), the Kurile (Chishima) islands, and the southern half of Sakhalin, called by the Japanese Karafuto (this last ceded by Russia in 1915) in the north. But these are all to be regarded as Japanese dependencies, Japan Proper being made up of the three main islands of Honshiu, Hondo or Nippon, Shikoku, and Kiushu between $41\frac{1}{2}°$ and 31° N., in a latitude accordingly corresponding to that of the eastern part of the Mediterranean region from the south of Bulgaria to the shores of the Nile delta. It is these islands that contain the great bulk of the Japanese population, and these only which are represented in the Japanese parliament. The small isolated island of Rasa, a little to the north of the Tropic of Cancer, south of Kiushu, and east of Formosa, is important for its phosphates. As to the Polynesian islands assigned to the Japanese since the War, see p. 830.

The character and effects of the **climate** will be understood from what is stated on p. 45. Both Tokyo and Sapporo show the wide range of temperature characteristic even of islands in the temperate zone on the east side of the great land-masses of the northern hemisphere, even though Tokyo is on the coast. The rainfall graph for Tokyo resembles those of the Yangtze valley more than of northern and southern China. Sapporo with its preponderance of winter precipitation (largely in the form of snow) may be regarded as fairly typical of the western side of the mountains, where moisture is received from the winter winds which have crossed the sea of Japan. Both temperature and rainfall graphs are explained by the wind and rainfall maps facing p. 28.

The entire group of the Japanese islands is highly volcanic, containing upwards of fifty active, besides numerous extinct, volcanoes. Like other highly volcanic regions it is much subject to earthquakes, which often do immense damage. In the great

earthquake of September 1923, which completely destroyed Yokohama and a large part of Tokyo, over 90,000 persons perished. The surface is extremely irregular, and though the passes are low relatively to the height of many of the mountains the slopes are generally steep. This has proved a hindrance in the construction of railways. Not till twenty years after the opening of the first line of railway in the country (1872) were there two lines connecting opposite sides of the main island. Tokyo and Kyoto, only 230 miles apart in a direct line, are 338 miles from one another by rail. Good roads scarcely exist. One difficulty in the way of their construction and maintenance is presented by the character of the climate and the natural drainage. During the rainy season the copious rains that deluge the mountain slopes cause frequent destructive floods on the banks of the numerous short rivers that descend on both sides. Many roads are then nearly impassable. These conditions have hindered the growth of motor traffic. Even now the bulk of the cars are taxis in the towns. Motor bicycles are, however, becoming popular and there are many million bicycles in the country.

The productive area of Japan is limited by the very irregular character of the surface. Less than 30 per cent. of the surface is reckoned as productive, and about 12 per cent. (less than one-eighth) of the entire surface is devoted to agriculture ; but as Japan lies, unlike the Mediterranean region, in an area of summer rains, it is enabled, notwithstanding its severe winters, to maintain on this relatively small area an extremely dense population, averaging over 500 to the square mile. All the plains and terraced mountain slopes are capable of yielding rice. By far the most densely peopled areas are that round the Bay of Osaka, together with the strip stretching westwards along the north shore of the Inland Sea and the valley running north from Osaka to Kyoto, and that known as the Kwanto Plain around Tokyo.

Besides rice, the principal food-crops are wheat, barley, rye, and soya-beans. Mulberry-trees, whose leaves are required for feeding silkworms (silk being the leading export), are planted in more than three-fourths of the provinces, everywhere in rows, allowing of space for other crops between. Tea, prepared for export as green tea, is grown chiefly between lat. 34° N. and 36° N., that is, in the south of Honshiu ; and the lacquer-tree (*Rhus vernicifera*, DC.), that is, the tree that furnishes the material employed in lacquering, one of the most celebrated of old Japanese industries, is cultivated mainly in the northern part of the same island, between 37° and 39° N. Camphor, which forms one of the more important among the minor exports of Japan, is also one of the ingredients used in the art, since that substance serves as a diluent for the lacquering material. Japanese agriculture leaves little room for live-stock. Horses are most numerous, and the government is

doing what it can to promote the breeding of good animals. A government bureau of horse-breeding administration was established in 1906. There are also government cattle farms and a government poultry plant. Pigs and goats have increased rapidly in numbers, but there are very few sheep. Japan is thus altogether without, or very poorly supplied with, some important products. It has no native wool, little milk, butter, or cheese, and a comparatively small supply of leather, which has to be replaced for different purposes by various other materials.

The Japanese fisheries for bonitos, herrings, sardines, tunnies, salmon, and a great variety of other fish, besides prawns and lobsters and cuttlefish in the home waters, as well as whales, fur-seals, &c., in more distant seas, employ a large proportion of the population and support still more. The deep-sea fisheries pursued off the shores of Korea, Formosa, Sakhalin, and the Chinese province of Kwangtung are especially important. Among the products of the fisheries, refuse fish prepared as what is called fish guano is largely used as a manure.

Of the **minerals** of Japan the most important is coal, the production of which is now about 30,000,000 tons a year. On the island of Hokkaido (Yezo) a railway was laid for the purpose of bringing the coal to Hakodate on the coast. Still more favourably situated are the coal-mines in the north-west of Kiushu, near Moji, and the south-west of the same island, at and near Nagasaki. The reserves of coal in the Japanese fields are comparatively small. The iron ores of Japan are for the most part not easy of access, but with the view of making itself independent of foreign supplies for defensive purposes, the Japanese government has spent more than two millions sterling in establishing iron and steel works at Wakamatsu on the north coast of Kiushu, at the western entrance to the straits of Shimonoseki, within twenty miles of both coal and iron mines, but depending chiefly on Manchurian and Chinese ores, which are largely in Japanese hands. The same is true of the great iron and steel works established in Hokkaido to utilise iron sands found there. Copper is an important metal produced at home. The copper ores of Ashio or Ashiwo, near Nikko north of Tokyo, are of high grade, and are produced in large amount. The production of silver is also important. Abundance of kaolin furnishes the raw material for the ancient and celebrated industry of the country.

Until quite recently in Japanese industry human labour, except in the towns open to western influences (some of these new creations), was assisted only by the most primitive tools and appliances. The plough is still comparatively rare. The deep and careful tillage of the ground is effected by means of the spade and other hand implements; and where the plough is used, it is an implement that merely scratches the surface, and is incapable of making anything like a furrow. No carts were used in farming, not even the Chinese barrow.

Everything was carried. A primitive hand-mill was the only apparatus used for grinding flour. Flour was, indeed, not much used. Bread was unknown till it was introduced by the Portuguese, and even yet is made only to a limited extent in the form of cakes, though the consumption of wheat is now rapidly increasing. All kinds of manufacturing industries were till recently almost entirely domestic, as they still are largely, some kind of handicraft being practised in nearly every Japanese household.

Great changes were, however, brought about in consequence of the change in the attitude of the Japanese government towards the civilised nations of the West. The Japanese then (about 1868) began to show great eagerness to learn from western nations. European languages (especially English) were taught in their schools. Foreign teachers of science were employed in their colleges and the university of Tokyo ; Japanese students were sent to Europe and America for education. Railways and telegraphs and modern textile and other machinery were introduced. Native coal-fields were developed with the aid of steam and electric power. Foreign trade was encouraged. At first this trade was limited to certain treaty-ports, where alone foreigners were permitted to reside, but where they enjoyed certain privileges. The first three of these were thrown open in 1858. At last, on July 17, 1899, the whole country was thrown open to foreigners to settle in and establish industries if they pleased ; but the privileges referred to were withdrawn. Resident foreigners were required to submit themselves to the Japanese law-courts like natives, the Japanese codes of law having meantime been more or less assimilated to those of Europe. Previously, in 1889, the government had been made a constitutional limited monarchy.

The first native steamship company was established in 1874. Magnificent vessels built in Japan are now seen in all waters, and since the inland navigation of Chinese rivers was thrown open to foreigners, the Japanese have been acquiring a larger and larger share of the trade. The rapid growth of Japanese shipping, favoured, it may be observed, by the growing exports of Japanese coal and imports of food-stuffs and other bulky produce, as well as by government subsidies, is shown in the shipping table in the Appendix. As early as 1908 the Chairman of the P. and O. Company stated that the Japanese had ousted them from the carrying trade between Bombay and Japan. The total tonnage of the Japanese merchant navy is over 5,000,000. Machine cotton-spinning factories have been established with great success, chiefly since 1882. The subsequent history of this industry is considered above (p. 177). Cotton weaving mills followed. In Japan, as in China, winter garments were often padded, but among the upper classes, and even among the richer tradespeople, the use of European woollen garments is

coming more and more into favour, and continued efforts are being made to establish woollen manufactures with modern machinery in the country. Even in the cities, however, Japanese women retain the old native costume. Paper-mills of foreign type have also been set up ; and a striking illustration of the power of Japan to compete with Europe in manufacturing industry was furnished in the match trade. Japanese matches, made by machinery of foreign type, are now supplanting Swedish in China, as well as in more distant countries such as India. Japanese exports of all kinds increased rapidly until 1919. A even more striking example has been afforded by the spread, all over the world, of Japanese rayon. The first locomotive built in Japan began running in 1893, and by the end of 1895 had run over 80,000 miles with perfect success. Dynamos and other electrical machinery are now among Japanese manufactures, and such machinery is now being more and more used in the application of the extensive water-powers of the country. In 1911 the water-power developed in Japan, mainly by turbines, was equivalent to 103,532 horse-power, as compared with 12,215 in 1905. In 1924 1,750,000 h.p. were installed, a figure since greatly increased. Modern machinery is now very largely manufactured in Japan even for export. It is significant that among the most rapidly growing imports are rice, wheat, flour, beans, peas, and other articles of consumption, besides woollens. Wages have also risen considerably. The year 1900 serving as base when wages in all trades were represented as 100, the index number of the wages of a male weaver and of a carpenter were in, 1887, 56 or less, but both rose to above 148 in 1910, and that of a day labourer's wages to 143. Meantime the index number for rice had risen to only 114, wheat to 136, soya-beans to 119 ; brown foreign sugar to 134, but white to 185 (' Financial Annals of Japan '). Since the War changes have been extraordinarily rapid. Between 1914 and 1925 the price of rice, barley, and beans trebled and other prices rose in comparison. But wages, of nearly all workers, more than trebled in the same period. In 1924 silk workers and factory hands were receiving about 1·00 yen per day ; skilled workmen in the building trades between 3·00 and 3·75 yen. Even at the higher rates Japanese labour remains low priced. Complaints are made, as in India and China, of its low standard of efficiency, but how much of this is due to the labourer himself, how much to defects in capital equipment and in organisation, involving at present excessive hours of work (in factories generally 11 hours per shift), it is difficult to estimate. In any case much of the success of Japan in competition with other countries is due to the fact that wages are still low in proportion to efficiency. Since 1916 Japan has had a Factory Act, but it came into operation only gradually, and did not take full effect till 1931, after which work in factories was prohibited between 10 P.M. and 4 A.M. During the War Japanese

manufactured goods, especially cotton piece goods, captured many of the markets in the East, notably in India. Later Japan failed to hold all the markets thus gained, but during the great depression of 1931–34 Japan was almost the only country with an expanding foreign trade.

The nature of the change in Japanese commerce in the twenty years before the War can be seen from the tables below. The only point on which remark need be made is the decline in the import of sugar which is due to the development of the sugar industry in Formosa and the duties imposed in the interest of that industry in 1901.

Nearly all the chief towns of Japan are seaports. Tokyo, the present capital and the world's third largest city after London and New York, is, however, accessible only to ships of small size, and its port is Yokohama, which has a safe harbour for vessels of any size. Great harbour works were begun in 1889, and the largest liners in the Pacific can now berth alongside the wharves. Twelve miles south of Yokohama is the government dockyard of Yokosuka. Osaka, the largest town in southern Japan and the chief seat of the cotton-spinning industry, which is here favoured by the abundance of labour and the extent of the local market, suffers from the same drawback as Tokyo, but Kobe, eighteen miles distant on the same bay, has an excellent harbour. The water alongside the piers has been dredged to a depth of 36 feet, and the harbour enlarged so as to enclose an area of nearly two square miles. In the year 1920 the Kawasaki Dockyard Co., at Kobe, constructed, besides cargo boats, a 45,000-ton battleship. Kyoto, the old capital of Japan, lies inland about twenty-five miles from Osaka and seven miles from Lake Biwa. Nagoya, at the head of the Owari Bay to the east, is an important manufacturing and commercial town noted for its porcelain and other artistic products, but is not accessible to sea-going ships owing to the silting up of the upper part of the bay. Nagasaki, on the other hand, on the south-east coast of the island of Kiushu, has an excellent harbour, and was much frequented as a coaling-station until the development of oil. It has not developed as have other ports despite one great shipbuilding yard. Deshima, an artificial islet close to Nagasaki, was the seat of a Dutch factory or trading-station as far back as 1641. On the Inland Sea in the south of the main island near Hiroshima is the naval arsenal of Kure. Niigata, the principal port on the west coast, may have its shipping stopped for part of the year by the strong surf that beats along the whole of this flat and dangerous coast during the prevalence of the winter monsoon. Hakodate, on Tsugaru Strait, in Hokkaido, has only a small foreign trade.

The pressure of population in Japan Proper has already been indicated, and it has been shown in what a precarious position the country stands if it is regarded purely as a manufacturing area.

There are obviously various solutions of the population problem. One is overseas emigration. But that means to foreign countries, and there are very few foreign countries who are anxious to receive the Japanese, quite apart from the fact that the people themselves dislike leaving home. There are many in the Hawaiian islands, there are some on the Pacific coast of the United States, and there are considerable colonies in Brazil, but the total number of Japanese who have emigrated does not much exceed half a million. Another solution to the problem is the diminution of the increase in population by a strict control of the birth-rate ; there are signs that birth control is coming, although until recently the subject was entirely taboo in Japan. On the other hand, the increase in the knowledge of medicine and medical skill and diminution of the infantile birth-rate tend to increase the population. The third solution, and the obvious one, is for Japan to secure for herself a certain supply of food-stuffs and raw materials, particularly food-stuffs, and there is no doubt that this economic motive is the primary one which has actuated Japan in securing control over the large territory of Manchuria.

Hokkaido. The above account refers to ' Old Japan '—the heart of the Empire. The northern island of Hokkaido belongs really to the outer territories. This large island, though said to have 25 per cent. of its surface fit for agriculture, has a severe climate. The Japanese do not take kindly to the climatic conditions, but two million have migrated there on the opening up of the chief places by railways. There is also a scanty population on the coast, chiefly engaged in fishing, and also a mining population.

Formosa, or Taiwan, is traversed from north to south by a range of mountains which, along with the narrow eastern plain, are inhabited by a semi-barbarous people. The inhabitants of the western plain are mainly of Chinese origin. Tea and camphor, the latter a government monopoly, are largely exported, and since the island became Japanese much attention has been given to the cultivation of sugar. The production of sugar in the island increased from 47,000 tons in 1901–2 to nearly a million tons recently. The import of sugar into Japan Proper from foreign countries sank from about 300,000 tons in 1901 to about 80,000 in 1911, and despite the increased population of Japan remains small. The island is the chief source of the Japanese camphor and is estimated to furnish three-fourths of the world's supply. The capital is Taipei, near the northern end, connected by rail with the port of Kilung or Kelung, which has an excellent anchorage, and near which are mines of good soft coal capable of being mixed with harder coal for use on steamers. Improvements have been carried out on the harbours of Anping and Takau on the west coast to promote the sugar industry, which is carried on in the neighbourhood.

JAPAN[1]

SPECIAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1891–95	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'25–29
1. Raw cotton	1·85	7·92	11·21	19·74	62·91	16·4	22·1	21·2	30·5	29·5
2. Iron, steel, and manufrs.	0·79	2·68	4·55	7·26	11·53	7·0	7·5	9·8	11·2	5·4
3. Machinery and locomotives	—	1·40	2·61	3·31	8·73	—	3·9	5·6	5·1	4·1
4. Oil-cake	0·09	0·93	2·16	3·40	9·14	0·8	2·6	4·7	5·3	4·3
5. Rice	0·54	3·92	2·09	3·35	5·68	4·7	10·9	4·5	5·2	2·7
6. Sugar	1·35	2·18	1·83	2·12	6·12	11·5	6·1	4·0	3·3	2·9
7. Cottons	0·68	1·40	1·83	1·34[3]	—	5·9	3·9	3·9	2·1[3]	—
8. Wool and yarn	0·13	0·65	1·56	1·94	13·06	1·2	1·8	3·4	3·0	6·1
9. Kerosene	0·55	1·55	1·45	1·30	2·13	4·6	4·3	3·1	2·0	1·0
10. Woollens	0·68	0·93	1·23	1·24	3·20	5·9	2·6	2·7	1·9	1·5
11. Beans and pulse	0·35	0·80	1·13	1·11	6·14	2·9	2·2	2·4	1·7	2·9
16. Cotton yarn	0 91	0·24	0·23	0·09	—	7·6	0·7	0·5	0·1	—
Average total value	11·51	35·92	46·40	64·63	213·48					

Principal Countries.	Percentages. '81–85	'01–05	'06–10	'11–13	'25–29
1. United Kingdom	48·1	19·8	22·8	18·8	7·5
2. British East Indies	8·0	19·0	16·6	21·6	15·4
3. China	18·3	14·1	15·7	12·6	9·8
4. United States	9·4	17·4	15·1	17·6	28·7
5. Germany	5·2	8·7	9·9	10·0	6·0
6. Korea	—	2·3	2·7	—	—
7. Belgium	—	2·1	2·1	1·4	0·6
8. French Indies	—	3·0	1·6	2·4	0·8
9. France	6·6	1·3	1·2	0·9	1·2
10. Australia	—	0·9	1·1	1·9	5·8
11. Kwangtung	—	—	—	—	6·8
Average total value in millions sterling	5·82	35·98	46·58	64·93	213·74

SPECIAL EXPORTS,[2] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1891–95	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'25–29
1. Raw silk	4·54	7·89	12·06	15·99	71·73	35·8	26·1	27·6	28·8	38·2
10. Silk waste and knubs	0·37	0·59	0·72	0·99	1·32	1·9	1·9	1·6	1·8	0·7
2. Silks	1·16	3·53	3·76	3·88	12·48	9·5	11·7	8·6	7·0	6·7
3. Cotton yarn	0·04	2·76	3·34	5·63	5·29	0·4	9·1	7·6	10·1	2·8
4. Copper	0·62	1·39	2·40	2·50	—	4·8	4·6	5·5	4·5	—
5. Cottons	0·22	0·92	1·97	2·85	37·10	1·9	3·0	4·5	5·1	19·8
6. Tea	0·99	1·73	1·83	1·78	1·14	7·7	5·7	4·2	3·2	0·6
7. Coal	0·71	1·72	1·79	2·12	2·55	5·6	5·7	4·1	3·8	1·4
8. Matches	0·39	0·90	1·06	1·17	0·65	3·2	3·0	2·4	2·1	0·3
9. Bamboo and wood	0·05	0·36	0·98	0·88	1·72	0·4	1·2	2·2	1·6	0·9
11. Porcelain and earthenware	0·20	0·37	0·63	0·60	3·16	1·5	1·2	1·4	1·1	1·7
12. Camphor	0·18	0·55	0·65	0·55	—	1·3	1·8	1·5	1·0	—
13. Fish and shell-fish	0·31	0·49	0·58	0·90	1·95	2·4	1·6	1·3	1·6	1·0
14. Matting	0·21	0·55	0·53	0·40	1·10	1·8	1·8	1·2	0·8	0·6
15. Rice	0·72	0·68	0·49	0·43	—	5·6	2·3	1·1	0·8	—
16. Paper	0·04	0·23	0·44	0·36	2·05	0·4	0·8	1·0	0·6	1·1
Average total value	12·61	30·23	43·70	55·51	187·55					

Principal Countries.	'81–85	'01–05	'06–10	'11–13	'25–29
1. United States	39·0	28·6	30·5	30·7	42·4
2. China	17·4	23·1	23·3	25·1	18·6
3. France	21·4	9·9	9·2	9·0	2·5
4. Korea	—	5·2	6·0	—	—
5. United Kingdom	11·3	5·0	5·7	5·3	3·5
6. Hong Kong	—	10·2	5·4	5·3	2·9
7. British East Indies	1·1	4·2	3·2	4·5	8·0
11. Straits Settlements			1·2	1·6	1·6
8. Italy	0·6	3·7	3·0	4·0	0·3
9. Germany	1·1	1·5	2·2	2·5	0·5
10. Russia	0·4	0·7	1·4	1·3	0·4
Average total value in millions sterling	6·03	31·15	45·30	56·47	193·76

Values of the Yen in Pence.

Year	1891	1892	1893	1894	1895	1896	1897
Value	38·6	31·5	30·7	25·2	25·3	26·0	21·5

Gold standard was adopted in October 1897, the yen being fixed at 21·5 pence. Its value, however, fluctuated considerably during and after the War.

[1] Including Formosa from 1896. Exchange rate for 1925–29 is calculated on the average for those years of 10·8 yen to the £ (1 yen = 1*s.* 10*d.*).

[2] Declared values (c.i.f.). Figures for 1911 and 1912 exports from *U.K. Statistical Abstract for Foreign Countries*, but 1913 figures from *Financial and Economic Annual for Japan* where, in the case of countries, they are for 'general' trade, *i.e.* native exports and foreign exports together.

[3] Average for *two* years, 1911, 1912.

Korea, or Chosen, as it is called by the Japanese, the mountainous peninsula between the Yellow Sea and the Sea of Japan, like Tibet was formerly a loose dependency of China, but in 1895, after a war between China and Japan, was declared independent, but was never really so. From 1905 it has been practically under the control of Japan, which annexed it in 1910. Of the Korean ports

JAPAN

SPECIAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs :					
Beans and peas	2·5	3·0	2·7		
Wheat	3·0	3·1	2·4		
Raw materials :					
Wool (raw and tops)	3·6	4·6	7·6		
Cotton (raw)	24·7	26·8	29·6		
Petroleum	1·8	3·6	5·8		
Metals	3·1	4·2	5·2		
Coal	1·2	1·7	2·0		
Other minerals	—	2·0	2·7		
Wood	5·3	4·3	2·4		
Oil-cake	4·2	4·3	2·3		
Manufactures :					
Machinery and parts	5·3	4·5	4·2		
Drugs and chemicals	4·6	2·7	3·3		
Iron manufactures	7·7	4·2	2·6		
Total value in 1,000 million yen	*2·45*	*2·10*	*1·86*		
Countries :					
United States	27·4	29·2	32·4		
China	9·7	10·2	12·0		
India	15·8	13·3	11·0		
Australia	4·9	5·8	9·5		
Germany	5·9	6·4	5·1		
United Kingdom	12·8	6·9	4·3		
Netherlands Indies	3·8	4·3	3·1		
Kwangtung	7·2	7·0	3·2		
Canada	1·6	2·9	2·5		
Straits Settlements	1·3	1·8	2·0		

Par rate of exchange 1 yen = 24·58 pence. In 1935 approximately 14 pence.

there are Chemulpho on the west coast, Wiju, further north on the Yalu, Ping-yang (or Phyong-yang) on the Tai-dong River in about lat. 39° N., but Fusan on the south-east, now with an excellent harbour, is far more important. Wonsan, or Yuensan, on Broughton Bay is also on the east coast. Seoul, the capital, is again noteworthy. Ginseng, a drug highly valued by the Chinese, is exported as a monopoly of the Crown. The chief exports are, however, beans,

rice, and gold. The production of raw cotton has increased. The cultivation of flax has been introduced. Gold and coal, including anthracite, are mined. The chief imports are cotton piece-goods and the trade is almost entirely with Japan.

JAPAN

SPECIAL EXPORTS

	Percentage of Total Value.		
	1921.	1926–30.	1931–35.
Foodstuffs:			
Cereals, pulses	—	1·8	2·4
Raw materials:			
Silk (raw)	38·7	36·2	22·1
Manufactures:			
Cotton tissues	18·5	19·7	20·7
Artificial silk tissues	—	—	4·6
Silk tissues	7·1	7·0	3·5
Other tissues and manufrs.	—	2·0	3·6
Knitted goods	1·3	1·7	2·1
Other apparel	—	2·7	4·9
Fibres and yarns	6·2	2·8	3·3
Metals and manufactures	—	2·3	4·9
Drugs and chemicals	—	1·9	2·2
Total value in 1,000 million yen	*1·76*	*1·87*	*1·78*
Countries:			
United States	41·2	40·4	27·0
India	7·5	8·3	11·5
China	19·3	18·1	11·2
Kwangtung	4·0	5·4	10·4
Netherlands Indies	3·3	4·0	6·8
United Kingdom	3·4	3·2	4·7
Egypt	1·5	1·5	2·7
Australia	2·3	2·2	2·6
Straits Settlements	1·3	1·6	2·2

TOWNS OF JAPAN, 1935

Tokyo	5,875,000	Hakodate	207,000
Osaka	2,990,000	Shizuoka	201,000
Nagoya	1,083,000	Sapporo	197,000
Kyoto	1,081,000	Kumamoto	187,000
Kobe	912,000	Yokosuka	183,000
Yokohama	704,000	Kagoshima	181,000
Hiroshima	310,000	Wakayama	180,000
Fukuoka	291,000	Saseho	173,000
Kure	231,000	Okayama	166,000
Sendai	220,000	Kanazawa	164,000
Nagasaki	212,000	Kawasaki	155,000
Yawata	209,000	Otaru	154,000

AFRICA

This continent, though not the least populous in respect of either the absolute number of the estimated population or the average density, is that which is of least importance as regards its contribution to external commerce. This is due partly to natural unproductiveness, which does not favour density of population over any large area ; partly to the backward state of civilisation ; and in particular to the fact that throughout a large part of the interior, at least until the end of last century, population and production were kept down by misgovernment, internal wars, and, above all, the practice of slavery ; partly to the fact that in no other continent had European influences, and especially European modes of production and transport, made so little headway.

The natural unproductiveness of the continent is in a large measure attributable to the want of rain. Africa lies as a whole in latitudes where the atmosphere is always able to retain large quantities of vapour uncondensed. Its surface, like that of Spain, is made up mainly of plateaus with bordering mountains, so that the interior is in most parts reached only by winds that have been deprived of the greater portion of their moisture. The only regions with fairly abundant rainfall are certain parts of the equatorial region, narrow strips on the east and south-east coast, and part of the north coast in the neighbourhood of the Atlas Mountains. There are vast regions in the north and the south-west entirely desert, or nearly so, except where capable of irrigation. The only district possessing a really high density of population is a small part of Egypt, in the north-east.

EGYPT

This country was for a long period, until 1882, a province of the Ottoman Empire. In that year commenced a period of over fifty years of British influence. At the request of the Khedive an expeditionary force was sent out to suppress a rebellion of the Egyptian army. A British protectorate was actually established during the Great War, when the reigning Khedive was deposed and a successor appointed with the title of Sultan. This situation was widely recognised until 1922, when Egypt became an independent sovereign state, its Sultan being proclaimed King. The matters

reserved at that time for further discussion were dealt with in the Anglo-Egyptian agreement of 1936, the main provisions of which relate to mutual assistance against aggression, to the future of the Suez Zone (which may be released from British control after ten years on Egypt's request), and to the increased opportunity for Egyptian influence in the Sudan.

The country extends from the Mediterranean Sea and the mouths of the Nile to Wadi Halfa in about latitude 22° N., a length roughly equal to the distance between the Scillies and the Shetlands. In the east it extends to the Red Sea and includes the peninsula of Sinai, and in the west the boundary is an almost entirely straight line running north to south through the Libyan Desert. The area of the country is 383,000 square miles, but this figure is of little significance, since by far the greater part of the territory is uninhabited and uninhabitable. Actually only about 13,600 square miles (equal to about one quarter of the area of England) may be called habitable—that is, cultivable. This area comprises the tract capable of being irrigated by the waters of the Nile—the Nile delta and a valley, varying in width from two to fifteen miles, lying between the deserts on either side—together with a few oases. On this tiny area are crowded over 14 millions of people, who are almost entirely dependent upon agriculture. The result is a density—over 1,000 to the square mile, rising to more than 1,500 in the delta region—almost unparalleled for an agricultural community except in parts of China. The total population of the desert portion of the country consists of but 40,000 nomads.

Two thousand three hundred years ago the Greek geographer Herodotus aptly called Egypt 'the gift of the Nile.' Agriculture in Egypt certainly depends for its very existence upon the annual flooding of the Nile, for the annual rainfall at Cairo is only one inch, and at Wadi Halfa precipitation is seldom known to occur. This annual flood, commencing in June, reaching a maximum in September and subsiding again in November and December, is the result of the summer monsoon rains occurring on the Abyssinian mountains. The perennial source of water in the lower Nile is the White Nile river, which rises in the East African Lake plateau; but the annual floods are brought by the Blue Nile and the Atbara rivers, which rise in the Abyssinian mountains. During the flood season the Blue Nile has been found to be responsible for nearly 70 per cent. of the water in the Egyptian Nile, the Atbara for 17 per cent., and the White Nile for 14 per cent.; during the period of low water the White Nile provides over 80 per cent., and is thus the mainstay of the dry-season flow. The Nile in Egypt begins to rise about the end of June, growing turbid and red with the fertilising mud which it holds in suspension. By the month of September it has reached the top of its banks and begins to overflow, except

where held in check by artificial embankments. At Cairo the rise is between 20 and 25 feet.

The methods employed for utilising this vast volume of water for the benefit of the crops have changed considerably in most parts of the country from those of the ancient inhabitants. But until only about one hundred years ago the sole method was that of the Pharaohs—the method described by Shakespeare in the words which he puts into the mouth of Mark Antony :—

> The higher Nilus swells,
> The more it promises: as it ebbs, the seedsman
> Upon the slime and ooze scatters his grain,
> And shortly comes to harvest.

It depends on the fact that thousands of annual floods have deposited silt brought down from Abyssinia to such an extent that the Nile banks in Egypt, below Aswan, are now slightly above the level of the surrounding floor of the valley. Cuts are made in the raised bank, and as the river level rises the water flows through on to the fields which are arranged in a series of basins separated by embankments. The water remains on the land, depositing its valuable load of fertile silt, for six to eight weeks and is then allowed to run back to the river, the level of which has meanwhile fallen. The seed is then sown in the mud, and the crop is reaped before all the moisture is dried up. By this method of irrigation the soil was condemned to sterility for half the year, during which it was either under water or baked to a degree of hardness which made it impossible to grow anything. By it, too, only such crops could be grown as ripen within a short period—such as beans, clover, lentils, wheat, barley, and onions. This method still serves over a million acres of land in Egypt, more than a quarter of all the cultivated land in the country. But of far more economic importance, because it guards against the risk of a poor flood, permits of more than one crop being obtained in the year, and greatly extends the range of crops which can be grown, is perennial irrigation.

Perennial irrigation of a kind has been practised from very ancient times, close to the river bank, by the use of the primitive 'shaduf,' a lever device for raising water from the river, but the use of dams thrown across the river to store the water for irrigation purposes dates only from the early part of the last century. Mohammed Ali Pasha built a barrage across the Nile at the head of the delta to dam up the flood-water, which could thus be used to irrigate the fields for a much longer period than would have been possible under the old basin system. These works were extended under British influence ; they consist of a pair of dams with sluices on the two main arms of the delta a little below Cairo. By their use a large part of the delta and the part of Egypt to the north-east of Cairo and the south of Zagazig have been made independent

of the state of the Nile. The delta sluices are closed about February or March, and little water is allowed to escape to the sea between the time of closing and the commencement of the flood season in July. Large earthen banks called 'sudds' are built across the mouths to retain the water for irrigation. During the present century other barrages have been built at various localities on the river in Middle and Upper Egypt, the intention being to allow the water in basins belonging to a group in one part of the valley to be supplemented in a low flood by canals led from the next group higher up.

In 1903 a dam was completed at Zifta, on the Damietta distributary of the delta about midway between Cairo and the sea; in 1909 another at Esneh about 100 miles north of Aswan, and in 1930 at Nag Hamadi, between Esna and Assiut. The greatest of all. however, is the gigantic dam at Aswan, which, with its first subsidiary at Assiut, was opened in 1902 and has since been twice enlarged. The Nile valley for 200 miles south of Aswan becomes a huge reservoir, the filling of which is accomplished between November and January. The water is drawn off into the irrigation canals between March and July. The Assiut dam gave new life to an irrigation system which was three thousand years old. One of Egypt's detached areas of habitable land, the oasis of Fayum, had been fed with water by the Bahr Yusuf, a channel derived from the Nile a little above Assiut and popularly attributed, as the name implies, to Joseph the Israelite. During the nineteenth century a new canal, the Ibrahimia Canal, was constructed for the irrigation of Middle Egypt, and it is from the upper part of this canal—now fed from above the Assiut dam—that the basins along the Bahr Yusuf, and the Fayum oasis, are now directly supplied.

One of the most striking results of this increase in the amount and reliability of irrigation water available has been the great increase in the population which can conveniently be supported. In 1882, at the commencement of British influence in Egypt, the population was 6,817,000; fifteen years later, in 1897, this had risen to 9,734,000, showing an increase at the average rate of 2·4 per cent. per annum, a rate unparalleled in any other country, either agricultural or manufacturing. At the census of 1927 the population numbered 14,200,000, increasing at the rate of 1·09 per cent. per annum.

Before the introduction of perennial irrigation, the agricultural year in Egypt was divided into three parts, the season of inundation, from June to October; the season of cultivation, after the subsidence of the waters, from October to February; and the harvest season, varying with the individual crops, from February to June. Only one crop could be obtained each year from a single patch of ground. The fertility was amply maintained by the annual deposit of silt,

supplemented in respect of nitrogen content by the growing of beans, lentils, and particularly the Egyptian variety of clover known as *bersim*. Under the new regime, many new features have been introduced. In the first place, it is now possible to obtain two crops per annum of the old staples of Egyptian agriculture, the small cereals and pulses. The winter crops occupy the ground between October and April, and the summer crops between April and October. Sometimes even an extra 'season' may be added, a quick crop of maize or millet being obtained between September and November. The following is a typical example of the succession of crops grown during a two-year period : Cotton is grown from March to the end of October, and is immediately followed by clover, of which perhaps seven cuts are taken ; in the next eighteen months from July onwards two crops of maize and one of wheat may be reaped, the wheat being grown in winter and spring ; the second crop of maize may be succeeded by clover, of which two cuts can be obtained before the ground is cleared once more at the beginning of March for cotton. Secondly, crops which require a rather longer season than was to be obtained under the old system are now able to be grown ; such as cotton, now the most valuable crop of all, sugar-cane, rice, maize, and millet. Thirdly, the use of the water in irrigation canals instead of in floods over the fields has deprived the soil of its annual deposit of silt. This is the most serious drawback to perennial irrigation. The silt is now deposited in the river-bed and in the canals and reservoirs, and increased labour is involved in removing these deposits, which are piled up on the banks. This is of little moment, however, beside the loss of fertility which has resulted. Artificial fertilisers are having to be used in ever-increasing quantities in order to maintain crop yields. Egypt is fortunate in having two available sources of such material, the nitrates—known as 'tafla'—of the Nile valley between Keneh and Aswan, of local importance, and the more recently discovered and far more valuable field of phosphate rock on the Red Sea coast near Kosseir ; but even so, chemical manures form an important item in the list of imports into the country, and the expense of these adds to the costs of agricultural production.

One feature of Egyptian agriculture which has scarcely been changed by the substitution of new for old methods of water supply is its comparatively primitive character when judged by western European and American standards. This is largely a question of lack of mechanisation, and is explicable by the practices of irrigation and land holding. Mechanisation is obviously difficult if not impossible in a land where the fields are small and are separated one from another by mud banks ; it is equally so when, as is actually the case, 68 per cent. of the land holdings are tiny compartments less than one acre in extent.

The principal commercial crop in Egypt is cotton. The plant was introduced into the country a little over a century ago by Mohammed Ali Pasha, the originator of perennial irrigation, and its cultivation has extended steadily ever since, very largely owing to two factors, the high quality of the product and the increased facilities for its cultivation in areas watered by the perennial canals. There are two main varieties cultivated. The finest, called Sakellaridis (or in the trade 'Sakel') has a silky lustre and a long staple of about 1½ inches, qualities which make it second only to the famous 'sea-island' cotton (p. 165) of the West Indies. It is grown mainly in the delta. Of several other types the most important is Ashmouni, still a good quality fibre though not so outstanding as Sakel. This is the principal variety grown in Upper Egypt. In all some 1½ million acres of land are planted with cotton every year. For various reasons, mainly connected with the decreased fertility of the soil and with the extension of cultivation over areas of poorer soil than formerly, the yield is generally below the very high figure of 500 lbs. to the acre which was maintained at the end of last century. All the same, the average over recent years of about 400 lbs. to the acre is still phenomenally high when compared with the United States average of 180 lbs. or the Indian figure of about 80 lbs. The Ashmouni variety is the higher yielder; Sakel seldom attains 400 lbs. to the acre. There seems little doubt but that the high price which Egyptian cotton commands has led to a slight deterioration in the methods of cultivation, consequent upon the desire of getting the maximum profit with a minimum expense of energy; the substitution of a two-year rotation in place of the three-year rotation, the growing of the plants too close, over-liberal watering, and so on, are features which may be expected to disappear with greater experience and with the increasing competition of cottons from other parts of the world.

The other crops are mainly cereals and pulses. Wheat occupies about 1,500,000 acres, maize 1,800,000 acres, barley 400,000 acres, millet 250,000 acres, and rice 300,000 acres, the last-named fluctuating considerably from year to year. Beans, lentils; clover, and sugar-cane are also important. In the oases, the more important of which are Siwah, far out in the desert west of Fayum, Kharga, west of Esna, and Farafra, west of Assiut, the same food crops are grown, and in addition dates, which form the chief commercial crop. Animals are reared as part of the farming system: oxen and buffaloes for draught and other purposes, sheep and goats, donkeys and camels; artificial fodder is available for these in the form of the bersim which is grown universally as part of the usual crop rotation. Of recent years there has been a tendency for an increase in the rearing of poultry, fed on millet, and Egypt has entered the world trade in eggs.

Communications in Egypt are naturally very closely linked with agriculture and settlement in the valley of the Nile. The river itself is of some importance as a waterway, for shallow-draught vessels are able to ply on it as far up as the Aswan dam, where a lock allows the ascent to Shellal, from whence navigation can proceed as far as Wadi Halfa. Several canals assist navigation from the Cairo district to the sea; the chief (the Mahmudia Canal) connects the western arm of the delta with the port of Alexandria; another connects Zagazig, on the eastern side of the delta, with the Suez Canal, which lies within Egyptian territory (p. 558). There are some 3,600 miles of railway serving the 13,000 square miles of inhabited land, so that a network of considerable density is present. Unfortunately in some respects, two gauges are in existence; about 800 miles of track are on the 2 ft. 6 in. gauge. These narrow-gauge lines, however, are mainly in the agricultural districts of the delta, where they are more conveniently employed than tracks of greater width; they act as feeders to the standard-gauge system of the State Railways. The main trunk lines of the State Railways connect the ports of Alexandria, Port Said, Ismailia, and Suez to Cairo, and Cairo with Shellal, the northern terminus of the Nile steamer route which runs southwards into the Sudan. Of recent years (since 1921) Cairo has become an air-port of major world importance; it is the junction of the British air lines to India and South Africa, has Dutch connections to Holland and the East Indies, and local services to Alexandria, Aswan, and Palestine.

The nature of Egyptian trade is shown in the following table. The relative importance of one single item, cotton, in the export trade is very striking. Of the products of the country which have not hitherto been mentioned and which do not appear in the table, two minerals are of value: manganese, mined in the Sinai peninsula and exported mainly to Britain for use in the steel industry; and oil, which is obtained near the Red Sea coast at Hurghada and elsewhere and refined at Suez, where it helps to supply the needs of the shipping using the Canal. The bulk of the foreign commerce is concentrated upon Alexandria, the ancient port, named after Alexander the Great, situated on the north-west extremity of the delta, away from the silt, which is swept eastwards by currents. Actually, about 80 per cent. of the import trade and 90 per cent. of the export trade of Egypt pass through this port. The remainder of the trade passes either through Port Said, at the entrance to the Suez Canal, a great coaling-station and *entrepôt* for Far Eastern traffic, Suez, or overland to and from the Sudan. The capital is Cairo, situated on the right bank of the Nile at the head of the delta, a natural converging point in the past for caravan routes, and now for rail and air routes. Its port is the suburb of Bulak.

EGYPT

SPECIAL IMPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1881–85	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '81–85	'01–05	'06–10	'11–13	'25–29
1. Cottons	1·63	2·69	3·28	3·86	7·21	19·9	14·7	13·2	11·0	13·3
2. Flour, wheat, and maize	0·07	0·61	1·49	1·82	2·90	0·9	3·5	6·0	6·6	5·3
3. Iron and steel manufrs.	—	0·96	1·36	1·51	2·03	—	5·3	5·5	5·6	3·7
4. Building wood	—	1·01	1·29	1·22	1·90	3·8	5·7	5·2	4·4	3·5
5. Coal	0·41	0·94	1·29	1·68	1·78	5·0	5·2	5·2	6·1	3·3
6. Tobacco	—	0·65	0·88	1·19	1·58	—	3·6	3·5	4·3	2·9
7. Machinery and locomotives	0·17	0·68	0·85	0·91	2·08	2·0	3·7	3·4	3·3	3·8
8. Linen manufactures	—	0·51	0·68	0·70	—	—	2·8	2·7	2·5	—
9. Woollens	0·27	0·35	0·45	0·51	0·79	3·3	1·9	1·8	1·9	1·1
10. Rice	0·09	0·33	0·40	0·41	0·40	1·1	1·8	1·6	1·5	0·7
11. Petroleum	0·14	0·23	0·33	0·40	2·61	1·7	1·3	1·3	1·5	4·8
13. Coffee	0·23	0·22	0·32	0·44	0·80	2·8	1·2	1·3	1·6	1·5
22. Indigo	0·27	0·18	0·12	0·10	—	3·3	1·0	0·5	0·4	—
Average total value	8·20	18·25	24·83	27·59	54·68					

Principal Countries.	Percentages of Total Value. '82–85	'06–10	1913	'25–29
1. United Kingdom, including Mediterranean ports	40·0	32·8	30·5	23·1
2. Turkey	18·2	12·2	9·8	2·3
3. France and Algeria	13·0	12·1	9·2	10·4
4. Austria-Hungary	11·9	7·0	7·0	—
5. Germany	—	5·1	5·8	6·7
6. Italy	3·6	4·9	5·2	9·4
7. British East Indies	—	4·1	4·8	3·8
8. Belgium	—	3·7	4·2	4·0
9. Russia	3·2	2·9	3·2	1·5
10. Sweden (and Norway)	—	2·0	1·3[3]	1·2[3]
11. China and Japan	—	1·7	0·9	3·3
Average total value	8·16	24·83	28·44	51·58

SPECIAL EXPORTS,[1] EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1881–85	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '81–85	'01–05	'06–10	'11–13	'25–29
1. Raw cotton	8·27	15·15	21·94	26·00	43·89	66·2	77·8	82·8	80·4	85·2
2. Cotton seed	1·51	1·76	2·42	3·56	2·43	12·1	9·0	9·1	11·0	4·7
3. Cigarettes[2]	—	0·48	0·40	0·42	0·38	—	2·5	1·5	1·3	0·7
4. Oil-cake	—	0·20	0·24	0·35	—	—	1·0	0·9	1·1	—
5. Onions	—	0·22	0·23	0·33	0·83	—	1·1	0·9	1·0	1·6
6. Hides and skins	0·15	0·10	0·18	0·21	—	1·2	0·5	0·7	0·6	—
7. Rice	0·14	0·13	0·18	0·29	0·41	1·1	0·6	0·7	0·9	0·8
8. Eggs	—	0·10	0·12	0·19	0·39	—	0·5	0·4	0·6	0·8
10. Gums	0·15	0·23	0·08	0·06	—	1·2	1·2	0·3	0·2	—
11. Sugar	0·46	0·39	0·06	0·15	—	3·7	2·0	0·2	0·5	—
13. Beans	0·74	0·22	0·03	0·05	—	5·9	1·1	0·1	0·1	—
15. Wheat	0·35	0·02	0·02	0·01	—	2·8	0·1	0·1	0·0	—
Average total value	12·49	19·48	26·52	32·33	51·51					

Principal Countries.	Percentages of Total Value. '82–85	'06–10	1913	'25–29
1. United Kingdom, including Mediterranean ports	66·5	52·1	42·6	30·7
2. Germany	—	9·1	12·7	5·7
3. France and Algeria	8·6	8·3	8·9	11·7
4. U.S.A.	0·2	6·7	7·7	13·1
5. Russia	7·0	5·8	7·0	2·7
6. Austria-Hungary	5·1	4·9	5·6	—
7. Switzerland	—	3·3	3·1	3·6
8. Italy	6·8	3·0	3·2	6·2
9. Turkey	3·2	1·7	2·5	0·3
10. Spain	—	1·7	1·8	2·1
11. China and Japan	—	1·5	2·3	4·5
Average total value	12·24	26·52	32·90	53·92

The values of the imports are partly 'declared values,' partly 'official values'; those of the exports are in the main 'official values' periodically fixed at 10 per cent. below the real values.

[1] Totals from 1902 include military stores. 1913 (for countries) and 1925–29 imports are 'general' and include bullion and specie; 1913 exports are general in the case of countries; 1925–29 exports are special in the case of articles, 'general' in the case of countries, and include bullion and specie. Exchange rate for 1925–29 is calculated at 97·50 piastres (100 = £E1) to £1 sterling.

[2] Exports from 1900 include cigarettes from imported tobacco.

[3] Sweden only.

EGYPT

GENERAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs:					
Animal and food products	—	3·0	2·7		
Wheat and maize flour	4·6	5·0	1·2		
Sugar	1·3	2·1	0·04		
Raw materials:					
Fertilisers (chemical)	3·5	4·5	6·8		
Oils	2·8	5·4	6·6		
Coal	3·2	3·2	4·5		
Building timber	3·7	3·6	3·5		
Drugs and chemicals	—	1·9	2·8		
Tobacco, and manufrs. of	3·5	2·9	2·6		
Manufactures:					
Cotton manufactures	17·3	15·6	14·4		
Silk manufactures	2·5	2·2	3·4		
Other textiles	2·1 [1]	9·9	9·1		
Machinery and engines	—	4·0	6·3		
Iron and steel	—	6·7	4·7		
Paper and printed matter	—	2·0	2·6		
Metals, and manufrs. of	13·3	2·4	0·6		
Total value in £E millions	*50·7*	*51·3*	*29·4*		
Countries:					
United Kingdom	27·6	22·2	22·9		
Japan	1·9	2·8	9·4		
Germany	5·8	7·1	7·8		
Italy	10·3	9·2	7·7		
France	9·4	10·4	7·0		
Belgium	3·7	4·1	4·8		
United States	3·5	4·9	4·0		
Roumania	2·0	3·4	3·4		
India	3·5	3·4	2·8		
U.S.S.R.	1·6	1·6	2·1		
Greece	1·8	2·0	2·1		
Turkey	1·6	2·3	1·6		
Australia	3·2	3·4	1·4		

[1] Wool only.
£E1 of 100 piastres = £1 0*s*. 6½*d*. sterling.

EGYPT

GENERAL EXPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Cotton (raw)	86·0	79·6	73·3		
,, (seed)	5·5	5·4	4·9		
Onions	—	1·8	2·8		
Rice	—	1·5	2·0		
Total value in £E millions	*65·7*	*46·0*	*29·9*		
Countries:					
United Kingdom	47·9	37·3	36·1		
France	13·0	12·0	11·0		
Germany	6·0	6·1	8·6		
Italy	6·2	6·2	7·2		
Japan	2·2	4·3	5·5		
Spain	2·2	2·4	3·9		
United States	10·6	11·5	3·8		
India	0·4	2·4	3·6		
Switzerland	3·4	3·6	2·9		
Russia	0·1	3·7	1·3		

YEARLY RETURN OF SHIPPING AND NET TONNAGE THROUGH THE SUEZ CANAL FROM ITS OPENING

TONNAGE IN THOUSANDS OF TONS (000 OMITTED)

Year.	No. of Vessels.	Tonnage.	Year.	No. of Vessels.	Tonnage.	Year.	No. of Vessels.	Tonnage.
1869	10	6·6	1892	3,559	7,712	1915	3,708	15,266
1870	486	437	1893	3,341	7,659	1916	3,110	12,325
1871	756	761	1894	3,352	8,039	1917	2,353	8,369
1872	1,082	1,161	1895	3,434	8,448	1918	2,522	9,252
1873	1,173	1,368	1896	3,409	8,560	1919	3,986	16,014
1874	1,264	1,632	1897	2,986	7,899	1920	4,009	17,575
1875	1,494	2,010	1898	3,503	9,239	1921	3,976	18,260
1876	1,457	2,097	1899	3,607	9,896	1922	4,347	20,861
1877	1,663	2,355	1900	3,441	9,738	1923	4,621	22,873
1878	1,593	2,270	1901	3,699	10,824	1924	5,122	25,261
1879	1,477	2,263	1902	3,708	11,248	1925	5,337	26,762
1880	2,026	3,057	1903	3,761	11,907	1926	4,980	26,060
1881	2,727	4,137	1904	4,237	13,402	1927	5,543	28,965
1882	3,198	5.057	1905	4,116	13,134	1928	6,081	31,906
1883	3,307	5,776	1906	3,975	13,446	1929	6,274	33,466
1884	3,284	5,872	1907	4,267	14,728	1930	5,761	31,669
1885	3,624	6,336	1908	3,797	13,640	1931	5,352	30,031
1886	3,100	5,768	1909	4,241	15,418	1932	5,029	28,354
1887	3,137	5,903	1910	4,538	16,575	1933	5,416	30,674
1888	3,440	6,641	1911	4,969	18,327	1934	5,651	31,736
1889	3,425	6,783	1912	5,372	16,672	1935	5,992	32,811
1890	3,389	6,890	1913	5,085	20,034			
1891	4,207	8.699	1914	—	—			

The average duration of the passage in 1887 (the first year in which night passages were allowed) was 34 hours 3 minutes; in 1890, 24 hours 6 minutes; in 1919, 16 hours 13 minutes. The percentage of the net tonnage passing through the canal made up by British shipping was in 1900 57·6, in 1901 57·8, in 1907 64·5, in 1920 64·0, in 1923 62·8, in 1934 54·0.

The dimensions of the canal in feet were:

	Depth.	Bottom width.	Breadth between Banks.
In 1870	23–26	72	175–330
In 1920	36–39	148–195	400–460

Length: Port Said to Suez = 100 miles.

ANGLO-EGYPTIAN SUDAN

Since its reconquest in 1896–99 from the Mahdists, who for sixteen years had held tyrannical sway over it, the area lying between Egypt and Uganda has been regarded as a joint dominion of England and Egypt, and has come to be known as the Anglo-Egyptian Sudan, or more simply as 'The Sudan.' It is administered by a Governor-General, appointed by Egypt with the assent of Britain. It covers an area of just over a million square miles, and its latitudinal extent—from 22° N. to 4° N.—covers the transition from lands of summer rainfall in the south to the absolute desert of the north. The heart of the country is the Nile valley; here are concentrated most of the population and commercial activity. There are numerous nomadic and semi-nomadic tribes, however, both to the west and to the east of the Nile, in the highlands of Darfur and the Libyan desert on the west, and in the Abyssinian foothills and the Nubian desert on the east and north-east. Some 300 miles of the shore of the Red Sea form the boundary of the territory on the north-east.

Proceeding southwards from the desert of Egypt, the amount of summer rainfall—much of it thunderstorms—increases steadily; thus Khartoum, in latitude 16°, has 5 inches annually, nearly all in July and August; at Lake No, in latitude 10°, the total is about 30 inches, and at Mongalla, in latitude 5°, it is nearly 40 inches, mainly falling between April and October. The seasonal character of the rainfall is responsible for the annual flooding of large areas in the south, where the topography of the vast basin of the Bahr-el-Jebel (or Upper Nile), which lies on an elevation of between 1,200 and 1,500 feet above sea-level, is extremely flat. These annual floods result in much loss of water by evaporation. The Bahr-el-Jebel is joined at the great swamp of Lake No by the Bahr-el-Ghazal, its only considerable affluent from the highlands of Darfur, and shortly afterwards by the Sobat, which collects the drainage of the Abyssinian foothills. Between the Sobat junction and Khartoum the main stream is known as the White Nile; it receives little or no water from tributaries on either side except the two great streams from the Abyssinian mountains, the Blue Nile and the Atbara, which are responsible for the annual flooding of the Egyptian Nile.

The natural vegetation of the Bahr-el-Jebel basin is savana, or tropical grassland; trees are only found along the water-courses, lack of perennial water and the natural annual firing of the grass preventing much tree growth elsewhere. The streams themselves frequently flow through swamps, where papyrus, bulrushes, and floating weeds grow in abundance. During the flood season much of this vegetation becomes detached and floats, blocking up the

water channels, causing further flooding and hindering navigation. This floating vegetation is called 'sudd.' The main stream of the Bahr-el-Jebel is regularly patrolled to preserve its navigability; it is navigable by stern-wheel steamers of shallow draught as far south as Rejaf. On the Sobat and the Bahr-el-Ghazal navigation can be accomplished only in summer, on the former to the Abyssinian town of Gambela, and on the latter to Wau. The savana becomes drier towards the north, and the ground is almost bare except during and just after the rains. Acacias are the principal trees.

The southern portion of the Sudan is inhabited mainly by primitive peoples, such as the Nuer and Dinka tribes, who support life by rearing cattle, fishing, hunting the hippopotamus, and growing crops of millet or maize after the summer rains. Some cotton and coffee are also produced, however. Over the remainder of the territory the products are mainly either collected or cultivated. Little mineral wealth has as yet been exploited, or indeed discovered. Some salt is obtained on the Red Sea coast, and a little gold at Gabeit, behind Port Sudan. Gum-arabic is the most valuable collected product, the Sudan being the world's principal source of this substance. The finest quality gum is derived from the tree *Acacia verek*, but the *Acacia arabica* is also exploited. Most of the gum comes from the central part of the territory, in the province of Kordofan. Of the cultivated crops, those used chiefly for food are the *dura* variety of millet, and dates, the latter being obtained mainly from the more desert regions of the north, the former cultivated almost everywhere where there are human settlements, both with and without irrigation. Sesamum and ground-nuts are also grown.

Economically the most important crop is undoubtedly cotton. Some American cotton is now being grown without the aid of irrigation, utilising the summer rains, in the Nuba Mountains region of Kofdofan province and in the Bahr-el-Jebel region; and some is also grown near the Nile where irrigation water is available from pumping-stations in the north. Of the 300,000 acres planted with cotton, however, the greater part produces irrigated Egyptian 'sakel' cotton. This was first cultivated in the north-east, in the lower parts of the Gash and Baraka rivers, around Kassala and Tokar, where in 1933–34 some 70,000 acres were grown, the cotton being sent to Port Sudan for ginning. Since irrigation water has been available in the Gezira, a wedge-shaped region lying between the White and Blue Niles south of Khartoum, this area has become the chief. It is a remarkably level area with a gentle slope to the west and north-west, an ideal irrigable tract. A mighty dam at Sennar, on the Blue Nile, was completed in 1925, and almost at once a quarter of a million acres of hitherto semi-arid land were brought under cultivation; further canal construction has increased

the area to about two-thirds of a million acres. Some 175,000 acres are under cotton. The importance of the cotton crop to the Sudan may be gauged from the fact that it represents nearly two-thirds of the total value of the export trade.

As in Egypt, live-stock are everywhere important. Forage crops grown in the irrigated areas provide fodder for cattle, whilst cattle reared on the natural grasses represent the chief source of wealth for the semi-nomadic peoples of the south. Sheep, goats, and camels are also reared, for milk, meat, wool, or hair, or as beasts of burden. Camel-caravan routes, formerly much frequented, though now almost supplanted by railway and motor roads, ran across the Libyan and Nubian deserts to the Red Sea; but the old market centres of El Fasher in Darfur, Berber on the Nile, and Suakin on the Red Sea coast have lost much of their former importance.

Nearly 2,000 miles of railway and some 2,400 miles of river-steamer routes carry most of the trade of the Sudan. As in Egypt, rail and river alternate up the Nile valley by reason of the impediments to continuous navigation provided by the cataracts which occur where the river Nile flows over the edges of the crystalline rocks of Nubia. The main line of railway runs from Wadi Halfa, on the Egyptian frontier (where connection is made with steamers to Shellal for Aswan) to Atbara, Khartoum, and Sennar, thus cutting off the great Dongola bend of the Nile, which is in part served by steamers (from Kerma to Kareima). The more important branches run from Atbara with Port Sudan, and from Sennar to the Kordofan market centre of El Obeid, and *via* the Gash cotton-growing area to the same port. River navigation on the White Nile extends from Khartoum nearly to the Uganda frontier, and in summer up the Blue Nile to Roseires. Road communication in the south, where the seasonal rains render maintenance difficult, is in its infancy, but all-season roads are available across the southern frontier into Uganda and the Belgian Congo; there is still, however, no permanent road linking northern and southern Sudan, the river and, more recently, the aeroplane providing the only routes. Aviation is increasing, and Wadi Halfa, Khartoum, and Juba are regular landing-grounds on the Imperial Airways Cape-to-Cairo service.

Khartoum, which was captured from the Mahdists, together with the large village of Omdurman on the opposite side of the Nile, in 1898, has been rebuilt as a European city and is the administrative centre. It lies at the junction of the Blue and White Niles, in the angle between them; it has about 50,000 inhabitants, and has derived much importance from its focal position and from the rise of the Gezira as an agricultural region. Its neighbour, Omdurman, is still but an overgrown native market village, though

it has 80,000 people. About 80 per cent. of the foreign trade of the Sudan passes through Port Sudan, on the Red Sea coast. An artificial port, constructed in 1906, when the railway reached the coast, to replace the old Arab harbour of Suakin, which was unable to accommodate large vessels, it has increased rapidly since the War, and is a regular port of call for liners bound from Europe to East Africa, India, and the Far East. A large part of its export trade is in cotton with cotton seed, nearly two-thirds of the whole. Other exports are gum, sesamum, skins, gold, and ground-nuts. The exports go mainly to Great Britain and Egypt ; the imports come largely from Great Britain and Japan.

THE EASTERN HORN

The ' Eastern Horn ' of Africa includes the Abyssinian mountains and the adjoining Red Sea and Indian Ocean coastlands of Eritrea and Somaliland. Much of the area is under Italian influence—Eritrea, Italian Somaliland, and, since 1936, Abyssinia also. The remaining areas are British Somaliland and the small French territory around Djibouti. Abyssinia consists mainly of lofty mountains and plateaus, and the population, numbering between five and ten millions, lives for the most part above 5,000 feet. Some forests, where coffee grows wild, occur at lower levels ; much of the land between 6,000 and 9,000 feet can be used for cultivation and pasture, producing cereals and fruits of Mediterranean type, whilst between 9,000 and 13,000 feet there are vast areas of open pastures where cattle and sheep are reared. Both people and methods in Abyssinia are primitive, and there is little intercourse with the outside world. The only link with modern civilisation is the French railway line from Addis Ababa, the old capital, to Djibouti, on the coast. Italian domination may result in the opening up of mineral deposits, of which numerous examples are known, and perhaps even in the colonisation of certain of the more favourable parts, where commercial agriculture might be established.

Eritrea, an Italian colony, lies to the north-east of Abyssinia and is partly highland and partly coastal plain. It is mostly semi-arid, and the population is semi-nomadic, but some Italian settlements, based upon irrigation, have been established on the coastal plain, where cotton and millet are grown. Asmara is the capital and Massawa the port, on the Red Sea. Some hides and skins are exported, and there is some pearl fishing along the shore. Italian Somaliland occupies a similar position on the south-east of Abyssinia ; it is even more desert than Eritrea, but some scanty pastures exist on the interior plateau, where cattle, sheep, and camels are reared. Some agricultural settlements exist on the coastal plain in the south, around the two main watercourses, the Webi Shebeli

and the Juba. Along the latter river a strip of territory 33,000 square miles in extent was obtained by cession from Kenya in 1926. Gums and hides are exported from the interior, and cotton and sesamum oil from the coastal plain. The chief port is Mogadiscio, formerly an important Arab trading-station. Since the annexation of Abyssinia by Italy in 1936, the Italian sphere of influence—Eritrea, Abyssinia, and Italian Somaliland—has been reorganised as Italian East Africa. British Somaliland, with a narrow coastal plain and an interior plateau, is also very dry and inhabited mainly by pastoral nomads who rear animals and collect gums. Its chief port is Berbera, another old Arab caravan terminus. French Somaliland is of little importance apart from the port of Djibouti, the terminus of the railway from Addis Ababa.

LIBIA

The vast area lying between Egypt and the French territories of north-west Africa, being the former Turkish province of Tripoli, was annexed by Italy in 1912, and forms *Libia Italiana*. The Great War interrupted its development, and only since about 1928 has a great drive been made by the Italians towards its pacification and colonisation. The western province, Tripolitania, was completely pacified in 1929, the eastern, Cyrenaica, in 1932. The area is mainly desert or semi-desert, but there are oases around Murzuq, Ghat, and Ghadames in Tripolitania, and at Kufra in Cyrenaica; there is also a coastal region, round Tripoli in the north-west and on the slopes of the Barka plateau in the north-east, where a rather arid variety of Mediterranean climate is experienced, and where most of the Italian colonisation has taken place. The total population of the territory is a little over three-quarters of a million, of whom about 35,000 are Italians, and the remainder Arabs, Berbers, mixtures of these two races, or Jews. Along the coast there are sponge and tunny fisheries, but in general the coast is rather dangerous owing to sandbanks, and the only small harbours of any consequence are Tripoli and Benghazi. The principal agricultural products are wheat and barley, tobacco, 'Mediterranean' fruits such as the orange and olive, and dates. Esparto grass is obtained from the drier parts behind the coast; and salt along the sea-shore. Sheep and goats provide wool and leather for local domestic industries. There are several short railway lines radiating from Tripoli and Benghazi, and aeroplane services connect the territory with Italy.

NORTH-WEST AFRICA, OR THE ATLAS LANDS

The Atlas Lands of north-west Africa, European rather than African in their structure and climate, and Asiatic rather than

African in their native population, are known to the Arabs as 'Jesirat-el-Maghreb'—the Island in the West; an expression justified by the existence of a large habitable area surrounded on the one side by the Mediterranean Sea and on the other by the Sahara Desert. The territories are as large as the British Isles and France added together, and owing to the parallelism of the main relief features with the coast-line there is considerable variety of topography and agricultural possibilities. The unity which the Atlas Lands possess to-day is the result of the unity of French political control over all but a small portion of the region; but the attainment of this unity is of quite recent date. During the past two thousand years one empire after another has conquered the area and left its mark: Carthage, Rome, the Vandals, the Byzantines, the Arabs, and the Turks. French influence dates from 1830. Algeria was proclaimed a French colony in 1834, but several decades elapsed before economic progress began; Tunisia accepted French protection in 1881, and after a long period of warfare the Sultan of the great Mohammedan empire of Morocco did likewise in 1912. The varying length of the period of French influence, and the proportion of native to European population result in distinct differences of development. Algeria, sometimes called 'France in Africa,' has been developed and colonised largely with a view to increasing France's material wealth and food supply; in Tunis the native population has a longer history of economic progress, and the European population is largely Italian; the development of Morocco is mainly post-War, and is in many respects phenomenal.

Algeria and Tunisia. Both Algeria and Tunisia are traversed by parallel chains of the Great and Little Atlas, but the principal cultivated area has a different relation to these mountains in the two dependencies. In Algeria the region best fitted for cultivation is a strip of lowland, or land at moderate elevation, between the coast and the Little Atlas, a strip known as the Tell; and the region between the Great and the Little Atlas is a plateau producing little besides alfa grass. In Tunis the chief area of cultivation is a valley between the two chains of the Atlas, namely the valley of the Mejerda, a river which regularly overflows its banks during the winter rains, irrigating and fertilising the neighbouring plains. The climate and products of both Algeria and Tunis are similar to those of southern Italy and southern Spain. In both wine is a product of growing importance and great promise.

Since the occupation of Algeria by France, repeated efforts have been made to increase the French element in the population by the planting of colonies. Land confiscated from the native Arabs and Berbers (Kabyles) has been granted to the colonists on varying terms, and villages have been erected for them in many parts of the country. Of recent years the results have been more

satisfactory than at first. In 1926 the French formed about 9 per cent. of the population of Algeria, and there are numbers of Spaniards. In Tunis, however, the French are outnumbered by the Italians. French rule has done much for the development of the resources of the colonies, though at a considerable annual cost to the mother country. Thousands of miles of excellent roads and many hundreds of miles of railways have been made. Harbours have been constructed. New land has been brought under cultivation by the sinking of artesian wells. The region south of the Atlas, the Biled-ul-jerid, or Land of Dates, is largely occupied by nomadic Arabs ; but here, also, date-planting has been largely increased by artesian wells, as on the Wed Rhir between Biskra and Tugurt. Far to the south the oases of Wargla and Golea also belong to Algeria.

The principal exports are wine, wheat, living animals (principally sheep), tobacco (mainly in the form of cigarettes), raw silk and eggs ; the principal imports : automobiles, paper, clothing, sugar, and petroleum. In the exports to the United Kingdom from both Algeria and Tunis alfa grass is still important, but the trade in this article has been considerably affected by the increasing use of wood-pulp in paper-making. The minerals already extracted on a commercial scale are iron and zinc ores and phosphate rock ; the latter is now of great importance. The iron ores are obtained from numerous mines in both Algeria and Tunis, and are exported from the ports of Oran, Tenes, Algiers, Bougie, Bona, and Tunis. These ores have only slight traces of phosphorus. Philippeville in the east is the port of Constantine. In Tunis the forests on the hill-slopes north of Mejerda are rich in cork-oaks and another species of oak which has a valuable tanning bark. They hence promise to be of increasing commercial value. At present the leading exports from Tunis are minerals and cereals (wheat and barley). The bulk of the Algerian exports go to France, and so do those of Tunis. After the establishment of a preferential tariff in favour of French goods in 1898, the value of British exports to Tunis at first declined, but they afterwards recovered. The principal British exports to Tunis before the War and now are coal and cottons ; among those to Algeria coal is by far the most important, machinery coming next.

Most of the ports of Tunis are only open roadsteads. The town of Tunis, the chief seat of the foreign commerce of the protectorate, is situated at the end of a very shallow lagoon, and vessels formerly had to load and discharge in the roadstead of Goletta, at the narrow mouth of this lagoon, but a canal through the lagoon, 21 feet in depth, now allows large vessels to reach the town. Susa (Soussa), Sfax, and Cabes or Gabes, on the east coast, are the ports chiefly frequented in the commerce with the interior of Africa,

inasmuch as caravans that ascend the valley of the Mejerda are obstructed on their way southwards by the shotts, or string of shallow salt lakes, that extend for about two hundred and fifty miles inland, to the south of the mountains. These shotts lie below the level of the Mediterranean. It has been proposed to let in the waters of that sea to cover the depression which they occupy; but the project has been abandoned as unlikely to prove remunerative. On the north coast, a strong naval station has been formed by the French at Bizerta at the narrow mouth of a lagoon.

Morocco. Morocco is a Mohammedan empire in the north-west of Africa, but since 1912 has acknowledged the protection of France, which is virtually dominant in the greater part of the country. Under a treaty concluded between France and Spain in the same year a zone in the north, with an average width of 60 miles, but excluding Tangier, was recognised as under Spanish control. Morocco includes, as a loose dependency, the oases of Tuat in the south-east, which are separated by one hundred miles of desert from the nearest cultivable parts of Morocco proper. The surface of Morocco proper is highly mountainous. The High Atlas traverse the country from south-west to north-east, and are connected at the north-eastern extremity with a coast range known as Er Rif. The chief permanent rivers of the country flow through the low-lands and plains in the angle between these ranges, and in that area lie also the chief towns—Marakesh (the present capital) in the south, and Fez and Mekinez or Meknes in the north. All of these lie at the base of the mountains, the western plains being extremely arid. South of the Atlas, the rivers, such as the Wady Draa, are temporary, containing water in their lower courses only when the snow is melting on the mountains.

Until the coming of French influence the government was one of the most fanatical in the world, and regarded all Christian nations with aversion, and even disdain. Foreign commerce consequently was in no way encouraged, and the export even of some of the most valuable commodities (such as esparto grass) was kept down by high export duties. There were no railways, no wheeled carts, no internal navigation. All goods had to be carried on the backs of animals, chiefly camels. Only two tolerable ports were opened to European trade—Tangier, on the Strait of Gibraltar, and Mogador, the port of Morocco, in the south.

Great changes have, however, been brought about since the date of European intervention. Large areas have a luxuriantly fertile soil, and the rivers in many places are well adapted for irrigation. These advantages are now being turned to account, and multitudes of farms have been sold at a cheap rate to European colonists, who are developing agriculture by modern methods. The fisheries (tunny, sardines, lobster, &c.) are being actively

prosecuted, chiefly by French fishermen. Iron ores mined in the Rif are now being exported from Melilla in the Spanish zone. Many hundreds of miles of motor-car roads have been built, and narrow-gauge and standard-gauge railways now connect points on the coast with the chief towns of the interior. Many mills of European type for treatment of the raw materials of the country have been erected, and water-powers are being turned to account by electricity. In French Morocco great attention is being given to the development of the port of Casablanca, which is connected by rail with the Algerian system (by way of Rabat and Fez) to the north-east, and Marakesh to the south-east. Important phosphate deposits, accessible from Casablanca, are now being exploited. Among the minor ports, Rabat has a good river harbour, but obstructed by a bar; Saffi, only an open roadstead. The harbour of Tetuan, in the Spanish zone, on a river entering the Mediterranean, requires to be cleared of sand.

The foreign commerce is at present characteristic of a developing country—the imports more than twice the value of the exports, betokening an excess of investment. It is chiefly with France and the United Kingdom. The chief exports are eggs, wheat and other grains, almonds, wool, linseed, and other agricultural products; but some native manufactures, such as fez caps and leather, are exported to various parts of Africa.

Towns of North Africa, 1931

Tunisia.		*Morocco.*	
Tunis	202,000	Marakesh	192,000
Sfax	40,000	Casablanca	160,000
Algeria.		Fez	107,000
Algiers	257,000	Tangier	60,000
Oran	164,000	Meknes	54,000
Constantine	105,000	Rabat	53,000
Bona	69,000	Tetuan	50,000

SOUTH AFRICA

British territory now extends from the south coast to Lakes Nyasa and Tanganyika, but with an intervening Portuguese wedge on the lower Zambezi. It thus includes, besides the Union of South Africa, the colonies of Southern and Northern Rhodesia, and the Nyasaland Protectorate. The Union of South Africa was formed in 1910 by the union of the former self-governing colonies of the Cape of Good Hope, Natal, the Orange Free State, and the Transvaal, which now form provinces of the Union with self-government in local affairs. The Bechuanaland Protectorate, Basutoland, and Swaziland are administered imperially, but, since 1915, the Protectorate of South-West Africa (formerly German South-West Africa) by the Union under mandate from the League of Nations. The seat of the legislature of the Union of South Africa is Cape Town, that of the executive government Pretoria.

Of this area the part to the south of the Zambezi has so much in common in the character of the physical features and the climate and the circumstances determining the economic development, that it will be convenient to take a preliminary general view of that portion, apart from the area to the north of the Zambezi, even though that river divides Northern from Southern Rhodesia.

Throughout British South Africa the rise of the surface from the coast to considerable altitudes in the interior is rapid. From the western half of the south coast the ascent is made in well-marked terraces, the innermost of which form tablelands of 3,000 feet or more in height. These tablelands are known by the Hottentot name of Karroos. The Great Karroo, which has a length of nearly three hundred miles from west to east and a width in many parts of seventy miles, lies between the Nieuweld Mountains and the Sneeuwbergen (Snow Mountains) in the north and the Groote Zwartebergen (Black Mountains) in the south. Its altitude gradually varies from under 2,000 feet in the west to above 2,500 feet in the east. To the south of it, in the west, lies the Little Karroo, which is drained from the west and east by the two headwaters of the Gouritz River, which finally escapes southwards through a notch (in Afrikaans *kloof*) in the Langebergen (Long Mountains).

On the eastern side the rise in terraces is not so well marked,

or at least not so regular. Here the main feature is the Drakenberg [1] (Dragon Mountain) Range, really the high eastern edge of the plateau, which may be said to begin in the south in the Stormbergen (Storm Mountains) to the north-east of the Sneeuwbergen, and then runs east and north parallel to the coast. Here are the highest mountains in South Africa, which descend inland to plateaus of more than 7,000 feet in altitude in Basutoland. The passes leading across them from Natal to the Orange River Province and the Transvaal are at the height of 5,500 feet and upwards. Still further north the higher mountains and tablelands of Rhodesia, such as the Matopo Hills in Matabeleland, are all towards the east.

Together with the physical features just described, the circumstance of most importance in determining the character of the climate of South Africa is its situation between the trade-wind belts of the Indian Ocean and the South Atlantic ; but it is to be carefully noted that a small portion in the extreme south-west receives winter rains from the westerly winds. In the rainfall diagrams on p. 29 the curves for Durban and Loanda may be taken as more or less typical for the greater part of the region, and that of Cape Town for the extreme south-west. Loanda, however, shows a much greater rainfall than is to be found anywhere on the west side of South Africa except in the extreme south. The karroos are subject to prolonged droughts, which cause them at times to present the appearance of hard, burnt-up deserts ; but, on the other hand, they are occupied by a vegetation singularly adapted to a climate of this nature—able, that is to say, to survive, though in a withered condition, the want of rain for months, and even years, so that in a week or two after the occurrence of rains the surface becomes green with herbs and bushes or richly coloured with multitudes of flowering plants. In such a climate, however, cultivation, and even the rearing of live-stock, are obviously precarious without irrigation, but development in this direction has made rapid strides during the past ten years. Technical and financial assistance is given by the State under the Union Irrigation and Conservation of Waters Act (1912). Throughout the greater part of the north-west of the Cape Province the annual rainfall is altogether insignificant. On a narrow strip of the south coast rains are fairly equally distributed all the year round, but the predominance of summer rains illustrated by the rainfall curve for Durban is the prevailing characteristic of eastern South Africa generally, owing to the fact that at that period an area of low barometric pressure in the interior greatly strengthens the trade-winds of the Indian Ocean and draws them powerfully inwards. Yet the curve

[1] Or Drakensberg. The interpolation of the *s* in English books and newspapers was originally due to carelessness, but is now the spelling adopted in the official Year Book of the Union.

for Durban is typical only for limited areas in the interior of South Africa. That curve shows a high rainfall throughout the summer. The whole question of the incidence of rainfall has since been studied with great care by the Drought Investigation Commission, whose Interim Report was published in 1922 and Final Report in 1923. In the greater part of South Africa it is only the rains at the end of summer, culminating in February and March, that fall with a fair amount of regularity and abundance. As this period of the year, in consequence of the high altitude and resulting rarity of the atmosphere, is immediately followed by a rigorous winter, those rains are useless for sowing. Accordingly only in a few parts sufficiently near the Drakenbergen to get rains in August and September can wheat be grown without irrigation. Sown at the time of those rains it is reaped in December. Dry farming (see p. 63) is a partial solution. Maize and a few other crops suited to warm, rainy summers can be grown more widely.

The rivers of South Africa being mostly fed only by summer rains have the characteristics belonging to all tableland rivers in countries with alternating rainy and dry seasons. They flow in valleys deeply cut below the general surface of the country and having a width and slope varying with the nature of the rock in which they have been cut. In summer they are in flood, and in winter they are mostly reduced to tiny threads, which in some parts trickle between heaps of boulders filling a wide bed bordered by high bluffs. The Orange, though longer than the Rhine, is navigable for boats only a few miles up. Even the east side of South Africa is practically without navigable rivers.

So long as the development of South Africa was dependent solely on agriculture and pastoral industries the character of the climate confined the bulk of the inhabitants to the south-west and to the east. The regions first settled by Europeans lie in the south-west; the desire for further territory suitable for pastoral and agricultural development, amongst other causes, led to the great treks to the east and north. In 1867 the first diamond was discovered in South Africa at Hope Town; the diamond-fields of Kimberley, discovered three years later, were the cause of the first long railway line being built into the interior. A greater stimulus to railway construction was given by the discovery of the gold-fields of the Rand in the southern Transvaal and the subsequent foundation of Johannesburg in 1886. The purely British settlements of Port Elizabeth and Natal were on the south and east.

The character of the coast-line as well as the superficial configuration have influenced the direction of the railways, and on all the lines into the interior the geographical features have necessitated the resort to heavy gradients. South Africa is almost entirely wanting in good natural harbours, and the points capable

of being made convenient for shipping are at great distances from one another. In False Bay, east of the Cape Peninsula, there is an admirable naval station at Simon's Town, but that is not so situated as to be suitable for a commercial harbour. Cape Town is 428 nautical miles from Port Elizabeth, this port 131 miles from East London, and this again 253 miles from Durban, and Durban 300 miles from Lourenço Marques in Portuguese territory on Delagoa Bay; and these are the only ports at which it has been so far found worth while to provide accommodation by harbours or even long piers for the large ships of the present day except for the small enclosed harbour at Mossel Bay. Delagoa Bay affords access to the largest vessels at all seasons, and steamers are able to discharge alongside of the railway terminus. Durban (Port Natal) has a fine sheltered harbour but with a very narrow entrance exposed to the south-east trade-winds, and vessels usually enter only in daylight. The entrance, formerly barred, has been dredged to an average low-water depth of over 35 feet. Port Elizabeth has been provided with a sheltered harbour at a cost of several million pounds. At East London the river has also been specially dredged and a turning basin created, which now allows fairly large ocean-going liners to come up and to quay up alongside. Cape Town lies around a bay forming partial shelter only and relies on its fine artificial harbour. Saldanha Bay, about one degree north of Cape Town, forms an excellent natural harbour, and is linked up by rail with the Cape railway system. Phosphate deposits of very considerable extent were worked during the War in this neighbourhood.

All the South African railways are on the gauge of 3 feet 6 inches. The electrification of the railways has been decided on in order to accelerate the rapidly growing traffic and so escape the necessity for widening the gauge or doubling the track. The first electrified section, from Pietermaritzburg to Glencoe in Natal, was opened in 1925, and gradually the whole line from Durban to Johannesburg has been dealt with. At the present moment all suburban lines on the Rand are being electrified, as well as the main line between Johannesburg and Pretoria. The table on page 665 gives the distances by rail from the chief ports to the interior and the time taken by different routes between Johannesburg and the seaboard. Greater distance is, however, in some cases partly compensated by easier gradients. A large proportion of the Natal railways have a gradient steeper than 1 in 35, and there are many curves of 300 to 350 feet radius. The line from Durban to Johannesburg, after ascending within sixty miles to about 3,000 feet, descends nearly 1,000 feet to Maritzburg, then in eleven miles climbs to 3,700 feet, and thirty miles farther on is at a height of 4,800 feet. The Orange Free State branch ascends by steep gradients the whole way from Ladysmith (3,820 feet) to about 5,520 feet in Van Reenen's Pass.

The line from Cape Town has curves as sharp as those on the Natal line, but the steepest gradients are from 1 in 40 to 1 in 45, and the highest altitude south of the Orange River is under 4,300 feet. On the line inwards from Port Elizabeth a gradient of 1 in 40 is necessary before Grahamstown is reached. The highest altitude on that line (near Naaupoort) is just under 5,200 feet, and that on the East London route nearly 5,600 feet (three miles beyond Cyphergat). On the Delagoa Bay line the great rise is within the Transvaal. Belfast, where the Ermelo line branches off, is 6,460 feet above sea-level, and in the 112 miles to the east of that there is a rise of 5,190 feet, equal to an average of 1 in 113. The sharpest rise is, however, from twenty to thirty miles east of Belfast, where there is a rise of 680 feet in about four and a half miles, equal to about 1 in 35. On this section a rack-rail is employed.

Distances in Miles by Rail

—	Cape Town.	Port Elizabeth.	East London.	Durban.	Lourenço Marques.	Beira.
De Aar Junction .	502	338	—	—	—	1,537
Kimberley . .	647	485	—	—	—	—
Bulawayo . .	1,361	1,199	—	1,854	—	678
Salisbury . .	1,659	1,497	—	—	—	380
Bloemfontein .	750	449	401	—	—	—
Johannesburg .	957 [1]	714	666	483	396	—
Pretoria . .	1,001 [1]	740	692	511	349	—
Barberton . .	1,284 [1]	1,023	975	794	136	—
Windhoek . .	1,383	1,221	1,282	1,634	—	—
Time by Rail in Hours						
To Johannesburg . .	29¾	34½	32½	20¼	17	82½
From ,, . .	28½	32¼	33	20¼	16½	83

[1] By Fourteen Streams.

THE UNION OF SOUTH AFRICA

Most of the details already given above on the physical geography of South Africa concern the Union of South Africa. Strictly, the Union comprises only the four provinces of the Cape, Orange Free State, Natal, and the Transvaal, and it will now be convenient to consider each of the provinces.

The physical conditions of the country undoubtedly retarded development; this was long accentuated by the antipathy between British and Boer settlers—culminating in the Boer Wars—and only happily settled by the formation of the Union in 1910. The gold- and diamond-fields attracted population: the gold-fields of the Rand (Witwatersrand) have only been successfully worked owing to the nearby deposits of coal cheaply and easily mined. The

markets furnished by the mineral fields in turn stimulated agriculture and other industries and justified expenditure on irrigation, especially for citrus fruits. South Africa began to export maize—91,000 tons in 1909, over half a million by 1923. A similar rise follows in the exports of citrus fruits, and later of dried and fresh fruits of various kinds. The expansion in commerce is seen in the table given below.

The Cape Province or, more correctly, the Province of the Cape of Good Hope, formerly known popularly as Cape Colony, embraces all South Africa to the Orange River and Natal, and in middle longitudes extends beyond the Orange to the Molopo. This last section comprises the territory of Griqualand West with the diamond-fields of Kimberley and Beaconsfield, and the territory which till 1895 formed the Crown Colony of British Bechuanaland. The province also possesses the whaling-station of Walvis Bay on the west coast of the South West Protectorate, about one degree north of the Tropic of Capricorn. The population is mainly to be found in the east and on a narrow strip of the south coast, a necessary consequence of the facts already mentioned. More than three-fourths are 'natives'—Bantus forming the most numerous section, with a few Hottentots and Bushmen in the west. The white population is mainly of Dutch, Huguenot, or British descent, and English and a modified Dutch (Afrikaans) are the principal languages. In South Africa the term 'coloured' is used in the special sense of meaning half-castes—a mixture of European stocks with the indigenous population. These half-castes are, in the Cape Province, the most numerous of the non-European population.[1] There were over half a million in the Union in 1931. There are also immigrant Malays and others.

The Dutch first occupied Cape Town in 1652 as a half-way house on the route to their settlements in the East Indies. The French Huguenots came as refugees in 1688 after the revocation of the Edict of Nantes. They soon amalgamated with the Dutch, adopting their language, French being used for the last time in a church service in 1724. These two elements formed the agricultural and pastoral population known as Boers (farmers). The colony was twice occupied by the British during the Napoleonic wars, the second occupation taking place in 1806, after which date the country became a British possession. The most important British settlement made in the colony was that which was established in 1820 at Port Elizabeth on Algoa Bay, which has ever since been a leading British stronghold. The British and Dutch sections of the population have not yet completed amalgamation, due partly to the difference of occupation, partly to inconsiderate treatment of the Boers in early

[1] Actual figures for *Cape Province*, according to last census, are as follows: Natives 219,159, Asiatics 10,356, Coloured 356,255, Europeans 503,998.

days by the British home government. The Boers are mainly farmers, the great majority pastoral farmers scattered over the country in farms of 2,000 to 6,000 acres or more in extent. The British are mostly traders living in the towns. As regards the government, the Dutch complained chiefly of two things—first, that the government would neither defend them against Kaffir raids nor allow them to defend themselves, and second, that when their coloured slaves were liberated in 1834 the compensation offered was quite inadequate, and the manner in which it was given very prejudicial to the Boers. The proportion of British and Boers among the white population has never been ascertained, but it is certain that the Boers form the majority.[1] It is usually said that the native population is increasing more rapidly than the white, but this is not borne out by the returns of the successive censuses.

Only a small proportion of the surface is adapted for agriculture. In the western half of the province irrigation is absolutely necessary for the growing of crops, except in a small district round Cape Town, where most of the products of the Mediterranean can be grown, and whence there is a rapidly growing export of the characteristic fruits of that climate. In the eastern half larger areas have a sufficient rainfall for agriculture, especially south of the Stormbergen and Drakenbergen, but these are mostly in the hands of African natives, who grow maize (mealies) and other grains adapted to warm rainy summers. The prevailing aridity promotes a thorny vegetation which is apt to injure the quality of the wool of the sheep reared.

The pastoral industry has from the first been of much more importance than the growing of crops in the colony. At first only cattle and the native sheep were reared, the latter an animal yielding excellent mutton but only a coarse kind of hair rather than wool. The merino sheep was introduced about 1812, and after that wool came to be the most important export of the colony. The present wool industry of the Union has been built up by the careful selection of rams and the breeding of pure merinos. The sheep are reared partly on grass on the coast strip, partly on the karroos, where they depend chiefly on the deep-rooted bushes. In the arid western parts of the Great Karroo, from eight to twelve acres are required on the average for the support of a single sheep, but in the eastern parts only three. It is from the ports of Cape Town, Port Elizabeth, East London, and Mossel Bay, that the great bulk of Cape wool is exported. Uitenhage, not far from Port Elizabeth, is a great wool-washing centre of the province. Graaff Reinet is the chief centre of the most productive pastoral area of the eastern Karroo. Besides

[1] This proportion is usually calculated in the ratio of $\pm$ 60 % Afrikaans-speaking and $\pm$ 35 to 40 % English-speaking, with other European nationalities about 5 % of the population.

sheep and cattle, the Angora goat has been largely reared since about 1840 and the ostrich since about 1865. Oudtshoorn, a rich irrigated district in the western part of the Little Karroo, had extensive fields of lucerne entirely devoted to the rearing of ostriches. The lack of demand for feathers in recent years has resulted in an enormous drop in the value of the export trade.

The diamond-fields of Kimberley have been actively worked since about 1871. The industry is now controlled by a few capitalists, who regulate both the methods and the amount of the production. Kaffir labourers are hired for terms of three months, during which they are never allowed to leave the works, where they live in enclosures known as compounds. Great expansion of the industry came when the diamonds of the surface deposits were traced to their source in the hard rock—known to the miners as ' blue ground '—actually a volcanic rock filling the round necks or pipes of ancient volcanoes. Working the hard rock and excavating to great depths necessitated the amalgamation of working and the beginning of the great combines associated with such names as Cecil Rhodes, De Beer, Joel, Oppenheimer, and others. Copper and coal are at present the only two other minerals of economic importance in the province. Copper is obtained in the nearly rainless district of the north-west, at the mines of O'okiep, whence the ore is conveyed by a mule railway to Port Nolloth for export. The coal production of the province is now very small. The chief mines were at Indwe, on a branch railway running about sixty miles east from Cyphergat, about the highest part of the line from East London to the interior. The quality is not good, and the coals have been unable to compete with the better qualities produced in Natal and the Transvaal.

In the parts of the province beyond the Great Kei river, known as the Transkeian Territories, which include Pondoland, the white population is very scanty. Here the mouth of the St. John's river forms an exceptionally good harbour. The want in this case is a hinterland. The Drakenberg Range prevents this harbour from being a means of access to the interior, but the Territories are capable of greater development, forming one of the best parts of South Africa, fertile, well-watered, and eminently suited for pasture.

Bechuanaland is a vast territory to the north of the Orange River and Griqualand West. It has a narrow strip adapted for maize and other cultures in the east, but in the west is mainly composed of the so-called Kalahari Desert, where the rainfall is very scanty, though there is much underground water, and where there is only a very small and scattered population of Bushmen, living as hunters. The Bechuana natives are skilled craftsmen, smelting and working iron and copper and carving wood. The part to the south of the Molopo and Nosob rivers or watercourses, with the towns of

Vryburg and Mafeking, became part of Cape Colony in 1895. The remainder is a British Protectorate with Serowe, the residence of the leading Bechuana chief, as its capital.

Natal. The Province of Natal, formerly a self-governing colony, extends from the Cape Province to Portuguese East Africa and the Transvaal, and is separated from Basutoland and the Orange Free State by the Drakenberg Range. From the Transvaal it is separated mainly by the Pongola river, the territory of the former colony having been extended. As its surface rises rapidly in elevation from the coast to the interior, its climate may be said to change from sub-tropical to temperate in the same direction. Near the coast are grown sugar-cane, cotton, tea, arrowroot, black wattle (by far the most important of the minor forest industries in the Union), and other tropical and sub-tropical products, and sugar is an important product. Further inland are grown the temperate cereals, and sheep and cattle are reared. Here also there is a large and increasing native population, mainly Zulu Kaffirs, who form the majority of the inhabitants, not only in the former Zululand north of the Tugela and Buffalo (annexed to Natal in 1897), but also in the former Natal. There are also above 140,000 Indians, originally introduced as coolie labourers on the tea and other plantations and as miners, but many of whom have remained as market gardeners and traders. The chief towns on the Natal railway system have already been mentioned. Durban is the chief seaport and largest town. Pietermaritzburg, the capital, though at an altitude of 2,200 feet, is situated amid scenes of tropical beauty indeed, but in a hollow in which the heat is oppressive. In the extreme north of the province Newcastle and Dundee rapidly increased their production of coal, which is better than that of the Cape Province, and, in spite of the long haul of 206 to 268 miles over the difficult railway route above described, is now largely exported by sea and made use of as steam-coal by ocean liners. Rather over a quarter of the Union coal production of 12 to 14 million tons is from Natal; most of the remainder from the Transvaal.

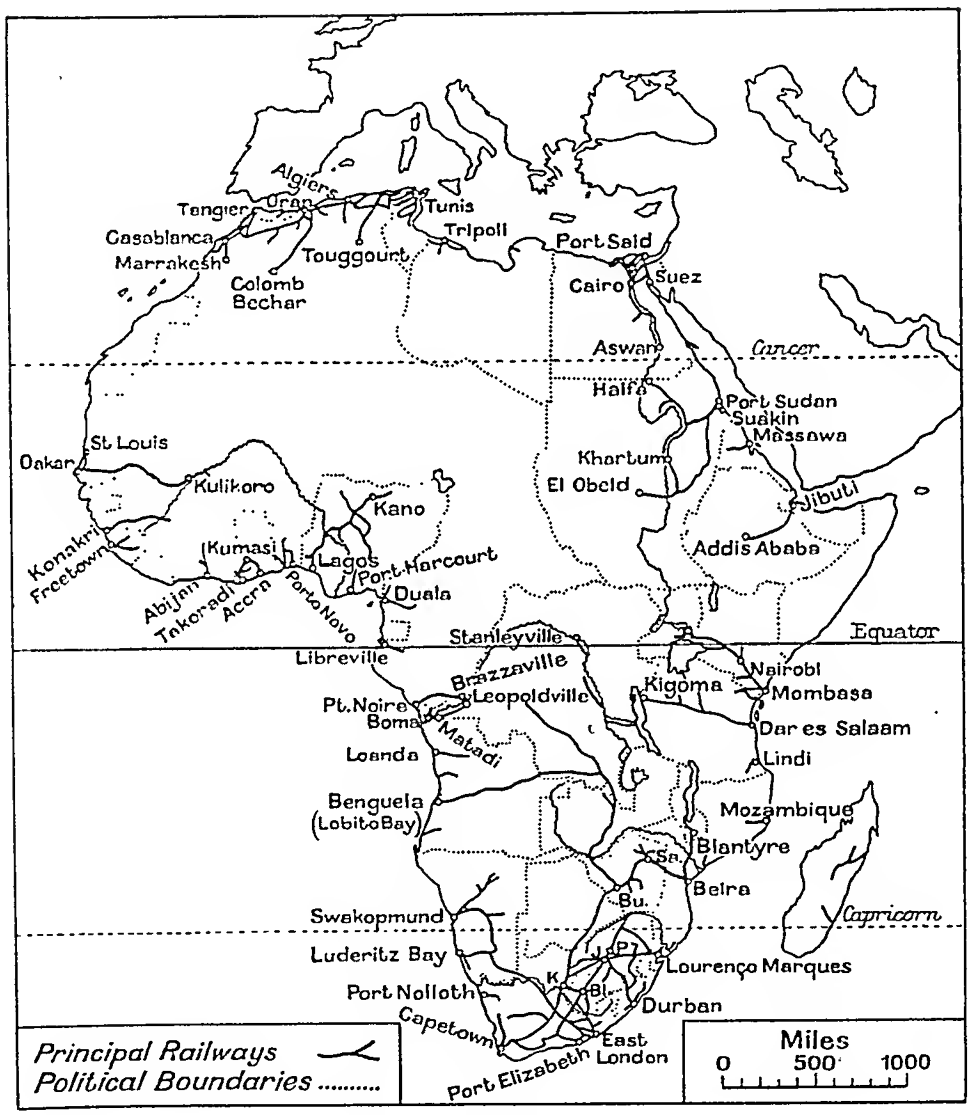
Basutoland is a British Crown colony almost entirely inhabited by a Bantu people of Bechuana stock. It consists of plateaus from 5,000 to 7,000 feet in height, sloping southwards and westwards from the Drakenberg Range, diversified by valleys, in some cases steep-sided, in others with gentle slopes. It has in most years a sufficient rainfall for the cultivation of wheat and other temperate crops, sown in July or August and reaped in December.

The **Orange Free State,** situated between the Orange and Vaal rivers, is a former Boer republic annexed by the British in 1900, when it became, till the Union in 1910, the Orange River Colony. The population is made up of the Afrikaans-speaking farmers or 'boers.' The surface is typical veld country, rolling grassy plains

seamed by river-beds. The plains vary from under 3,500 feet in height in the west to about 5,500 in the east. Much has a rainfall inadequate for agriculture without irrigation, but the north-eastern half forms part of the great ' maize triangle.' These north-eastern districts of the colony lack these August-October rains, but on the other hand have abundant rains from December to March, and are thus well adapted for the cultivation of maize. The remainder of the country is essential sheep-farming land. Among the minerals are diamonds in the south-west at Jagersfontein and Koffiefontein, and coal in the north of Kroonstad and elsewhere. The capital is Bloemfontein, situated, as shown on the railway map of Africa, on the direct railway route from Port Elizabeth to Johannesburg and Pretoria. At Vereeniging, on the Transvaal side of the border, the manufacture of various products from high-grade maize is carried on.

The **Transvaal** is another former Boer republic annexed by the British in 1900. In Johannesburg and the Rand generally (that is, the great gold-mining district in the south) the majority of the white people are of British origin, but outside of the gold district the population is mainly Afrikaans-speaking, being descended from Boers who emigrated from the Cape Province in bitter discontent with British rule. The surface features are similar to those of the Orange Free State, but here the geological structure, even apart from the mineral wealth, is of great importance. The Transvaal may be divided into five regions. The most important is (1) the Witwatersrand—the gold-field stretching from east to west through Johannesburg. (2) The High Veld lying to the south of the Witwatersrand, composed of undulating grassy plains at an altitude of 4,700 to 5,700 feet, with very cold dry winters, but with a rainfall from January to March rendering it suitable for the cultivation, without irrigation, of maize, potatoes, and other roots, as well as of pulses, though these last are at present neglected. (3) The Bush Veld north of the Witwatersrand, and (4) the Low Veld to the east, in both of which the plains are generally below 3,000 feet in height, and hence, being in a latitude below 26° S., not well adapted for European settlement. Both are traversed by comparatively high ranges of hills. Farmers migrate (trek) from the High Veld to the Low Veld on account of the dying down of the grasses on the High Veld in the winter. (5) The South-western District, an arid and comparatively unproductive region.

The mineral wealth of the Transvaal is enormous in amount and varied in character. The first place belongs to gold, which is found in paying quantity in many parts of the country. The deposits first exploited were those of the De Kaap field in the east, in which the town of Barberton was founded in 1885. But this and all other deposits have been rendered of quite minor importance since the discovery, about the same time, of the gold-fields of the



THE RAILWAYS OF AFRICA

Rand (Witwatersrand). On the richest part of the Rand the town of Johannesburg was founded in September 1886, and at a census

UNION OF SOUTH AFRICA [1]

GENERAL IMPORTS,[2] INCLUDING BULLION AND SPECIE

Class of Import and Principal Articles.	Average Value in Millions Sterling.			Principal Countries.	Percentages.		
	'10–14	'15–19	'25–29		'10–14	'15–19	'25–29
1. Animals (living)	0·18	0·14	0·05	*British Empire*	*70·1*	*68·5*	*60·3*
2. Agricultural articles	0·85	0·77	1·87	United Kingdom	59·0	54·2	47·0
Implements	*0·59*	*0·54*	*1·32*	Australia	4·5	3·2	2·5
3. Food and drink	6·45	5·35	7·94	Canada	1·9	3·1	3·0
4. Raw material	3·61	3·68	5·81	India	2·5	5·2	3·5
Iron and steel	*0·92*	*1·03*	*1·95*	*Foreign countries*	*29·9*	*31·5*	*39·7*
Wood	*0·98*	*0·78*	*1·92*	France	1·4	1·2	2·0
5. Manufactured articles	26·76	31·44	57·19	Germany	8·0	—	6·4
Machinery	*2·36*	*1·90*	*3·98*	Sweden	1·7	2·0	1·6
Metal Manufactures	*2·44*	*2·04*	*5·12*	Japan	0·2	2·8	1·4
Oils	*0·76*	*1·33*	*2·98*	United States	7·9	17·1	15·7
Apparel	*2·61*	*2·64*	*3·61*				
Boots and shoes	*1·21*	*1·33*	*1·06*				
Cotton goods	*3·04*	*6·67*	*4·15*				
Bags	*0·44*	*0·98*	*1·39*				
Haberdashery, &c.	*1·50*	*1·14*	*1·51*				
Railway materials	*1·93*	*1·40*	*3·49*				
6. Specie	1·27	1·82	0·05				
7. Local imports [3]	0·10	0·41	2·69				
Average total	39·20	43·61	75·59				

GENERAL EXPORTS,[2] INCLUDING BULLION AND SPECIE

Class of Export and Principal Articles.	Average Value in Millions Sterling.			Principal Countries.	Percentages.		
	'10–14	'15–19	'25–29		'10·14	'15–19	'25–29
1. Animals (living)	0·04	0·05	0·03	British Empire	91·5	84·7	76·0
2. Agricultural produce	10·24	18·08	27·43	United Kingdom	88·3	78·6	58·3
Maize	*0·41*	*1·15*	*2·74*	India	0·1	0·1	10·7
Ostrich feathers	*2·29*	*0·63*	*0·08*	Foreign countries	6·4	12·0	21·5
Hides and skins	*1·55*	*2·78*	*3·41*	Belgium	1·1	0·3	3·0
Mohair	*0·90*	*1·08*	*0·75*	France	0·3	0·4	4·8
Wattle bark	*0·28*	*0·35*	*0·71*	Germany	3·1	—	4·7
Sugar	*0·02*	*0·15*	*0·91*	Holland	0·1	0·1	2·1
Wool (sheep's)	*4·49*	*9·67*	*15·25*	United States	0·8	6·7	2·0
3. Mineral products	43·40	50·79	59·06	Japan	—	2·5	0·2
Coal	*1·17*	*2·52*	*3·12*	Ship's Stores and Postal Articles	2·1	3·3	2·5
Diamonds	*8·69*	*6·33*	*10·52*				
Gold	*32·67*	*40·91*	*43·99*				
4. Other articles	0·35	1·13	1·09				
5. Local exports [3]	0·53	0·70	2·20				
6. Re-exports	1·46	3·07	3·39				
7. Specie	0·26	0·16	12·55				
Average total	56·28	73·98	93·29				

[1] Comprising Cape Colony, Natal, Orange Free State, and the Transvaal. In the four years prior to the Union (1906–9) the imports of the four States averaged £28·50 million and the exports £45·80 million.

[2] Figures from the *Official Year Book of the Union of South Africa* include Government stores, but exclude specie in 1925–29 for principal articles.

[3] Mainly to and from Southern and Northern Rhodesia and, since 1915, South-West Africa.

held in 1896 the population of the town and district was found to have grown to upwards of 100,000, of whom about half were whites. The Rand is a ridge about sixty miles long, rising about 1,000 feet above the adjacent country. The gold-bearing rocks are

a conglomerate, in which the gold occurs in the form of minute particles more or less evenly disseminated through it. Hence powerful machinery is required for its extraction, and from the first this has been a capitalist's, not a poor man's, gold-field. Naturally

UNION OF SOUTH AFRICA

GENERAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Foodstuffs	—	—	*8·7*		
Raw materials	—	—	*9·9*		
Wood	2·9	2·7	2·3		
Mineral oils	3·9	4·1	3·9		
Chemicals and drugs	3·5	3·9	4·8		
Manufactures	—	—	*79·8*		
Cotton manufactures	11·3	7·7	7·1		
Woollen "	2·9	2·9	3·1		
Silk "	1·7	2·0	1·1		
Haberdashery, and hats	2·3	2·1	2·1		
Apparel (not shoes)	6·7	8·8	7·4		
Machinery	8·8	10·3	15·9		
Mining	*1·6*	*1·4*	*2·1*		
Agricultural	*1·7*	*1·8*	*1·3*		
Electrical	*2·6*	*3·6*	*4·9*		
Iron and steel	2·4 [1]	9·6	8·0		
Motor vehicles and parts	5·5	7·3	7·5		
Cardboard and paper	3·3	2·1	2·6		
Printed matter		1·0	1·2		
Jute and cotton bags	1·6	2·0	1·4		
Total value in million £	*58·1*	*67·8*	*51·7*		
Countries:					
United Kingdom	51·5	45·2	47·6		
United States	13·9	15·9	14·3		
Germany	5·4	6·8	6·3		
Canada	3·3	3·0	3·4		
Japan	1·1	1·7	3·9		
India	3·3	3·3	2·6		
Belgium	1·6	2·1	2·1		
France	1·7	2·1	1·5		

[1] Pipes and galvanised iron only.

every effort was made to develop the field with the utmost rapidity. The chief difficulty consists in devising means for attracting labourers on the terms most profitable to the owners of the mines. After the South African War, the difficulty of obtaining white or native labour to work in the mines resulted in Chinese coolies being introduced. These were gradually repatriated, and in 1909 the

Transvaal-Mozambique Agreement licensed recruiting agents, under certain conditions, to engage natives of Portuguese territory for service in the Transvaal mines, from south of 22° S. In 1888 the total production was 172,000 ounces ; in 1898, the last year before the Boer War, it was 3,565,000 ounces ; by 1913 it had reached 8,431,000 ounces, and in the years 1927 to 1936 remained comparatively steady between 10 and 11 million ounces. The coal resources of the Transvaal and Natal are practically unlimited.

The Transvaal is also rich in other minerals. Coal has been

UNION OF SOUTH AFRICA

GENERAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	—	—	*8·1*		
Maize and maize meal	1·3	3·4	1·7		
Fresh and dried fruit	—	1·6	3·3		
Sugar	—	1·5	2·2		
Raw materials	—	—	*17·3*		
Wool	18·8	18·9	11·9		
Diamonds	9·4	13·1	4·2		
Manufactures	—	—	*3·2*		
Gold bullion [1]	53·0	42·5	64·6		
Total value in million £	*75·8*	*73·5*	*64·7*		
Countries :					
United Kingdom	61·4	63·6	77·4		
France	3·6	4·8	3·6		
Germany	3·8	4·5	3·2		
Rhodesia	2·1	4·0	3·7		
Belgium	2·1	3·4	2·7		

[1] Excludes Rhodesian gold.

The total values are in South African currency: the same as sterling until September 21, 1931, after which South Africa remained on the gold standard for some time but later followed sterling so that the average rate for 1935 was £1 sterling = £1·00875 South African.

mined almost since the foundation of Johannesburg at Boksburg, a short distance to the east. Very important workings are now at Middelburg and Witbank. What are described as inexhaustible quantities of rich iron ore, containing upwards of 60 per cent. of metallic iron, are found in lenticular deposits all round the Bush Veld. These cannot all, in present conditions, be worked with profit, but they are said to be amongst the largest in the world awaiting development. The iron and steel industry of South Africa was greatly stimulated by the War, and is being steadily developed. The Electricity Supply in the Union has been organised and centralised under an Electricity Supply Commission with the

result that today in all the larger centres electricity for industrial purposes is unlimited and amongst the cheapest in the world.

The Foreign Trade of the Union of South Africa. The details of this will be clear from the tables given on pages 672–4.

South-West Africa, between the Cape Province and latitude 18° S., with the exception of Walvis Bay, formerly a German colony, was handed to the Union under mandate in 1919. At present this region has few commercial products except diamonds, but it is in parts adapted for cattle-rearing and karakul sheep-breeding—the latter having been the mainstay of the territory all through the recent years of depression. The southern part and much of the east is barren and desert, but there have been extensive boring operations for water, some of them successful. Walvis Bay is the best natural outlet for the territory, but the Germans had formed an independent harbour at Swakopmünd, a little to the north, and made a railway thence to Windhuk, the seat of administration in the interior, near which copper is known to exist in considerable quantity. Copper also occurs at Otavi, in the north of the territory, and other minerals known to exist in payable quantities are diamonds, ores of tin, lead, and iron, and marble. The lack of water has prevented and probably will continue to prevent any great area being brought under cultivation. Irrigation schemes on a small scale were begun by the Germans, but without irrigation on a wide scale agriculture cannot be developed to any extent. The karakul sheep, from which 'Persian' lambskins are obtained, was introduced by the German government in 1907, and, crossed with native sheep, has yielded satisfactory results, especially on the higher plateau of Damaraland and Namaqualand.

Towns of South Africa (1931—Europeans *only*)

Johannesburg	203,000	Pretoria	62,000
Cape Town	151,000	Port Elizabeth	44,000
Durban	62,000		

Europeans and Natives.

Salisbury	29,000	Bulawayo	34,000

THE RHODESIAS

Rhodesia, extending northwards from the eastern part of Bechuanaland and the Transvaal to the Congo Territory, was brought by treaty within the sphere of British influence in 1888. Most of that part of it which lies south of the Zambezi, even though it reaches far within the Tropic of Capricorn, may be included in temperate South Africa, inasmuch as it embraces a large extent of tableland from 4,000 to 5,000 feet in height, with tracts healthy

for Europeans. Sleeping sickness has appeared, but not to any extent. The higher parts of the tableland are in Matabeleland and in the south round the Matopo Hills, a district taking its name from a warlike tribe of the Zulu family which once held sway over a vast area round about, and in Mashonaland in the north, a district named after a peaceful industrial tribe formerly subject to the Matabele. The natives are remarkably submissive to white rule, recognising the greater security of property afforded, as compared with former times. The British South Africa Company, which obtained a royal charter in 1889, here had its principal field of operations. The charter empowered the company, among other things, to acquire rights of government, but reserved to the Crown the right of assuming dominion if it saw fit. The first settlement made by the company was at Salisbury, in Mashonaland. In 1894 a war with the Matabele led to the occupation of their territory by the company, and there a well-built town now takes the place of the former Matabele capital of Bulawayo, which since 1897 has been connected with Cape Town by rail. In September 1923 Southern Rhodesia became an independent member of the British Empire, and the British South Africa Company relinquished its land rights, but was granted the mineral rights in the new colony. In 1924 North-western and North-eastern Rhodesia, previously united as Northern Rhodesia in 1911, became a Crown Colony, and the Crown took over the administration from the South Africa Company.

Southern Rhodesia. The higher parts of Southern Rhodesia are suitable for European settlers and European crops. Maize and tobacco are especially important; citrus fruits and dairy farming are increasing. One of the finest irrigation works in South Africa is that from the Mazoe River in the north-east corner of Southern Rhodesia. A big dam has been built and an extensive system of subsidiary channels has been prepared for the purpose of irrigating 6,000 acres of adjoining lands. The reservoir formed by the dam has an approximate area of four square miles and a capacity of some five thousand million gallons.

Ancient ruins show that gold was worked in this region at some remote period. The most remarkable of these are the Zimbabye or Zimbabwe ruins, about 180 miles due east of Bulawayo. The large production of gold approaches a million ounces, compared with 16,378 ounces in 1898. The Wankie coal-field has an output of nearly a million tons and the quality of the coal is excellent. Not far from the Wankie coal-field are the Victoria Falls, where the Zambezi, here a mile wide and forming the boundary between Northern and Southern Rhodesia, plunges from a height of 340 feet into a narrow gorge. The railway was opened to the Victoria Falls in June 1904 (they were discovered by David Livingstone in 1855) and a bridge, of a single span, 650 feet long was completed

in the following year. It now serves both as a rail and road bridge. The Victoria Falls Power Company have long held a concession to develop power, but actually used Transvaal coal for their supplies to the Rand, and the connection with the Falls remained nominal till 1936 when a beginning was made with power works.

Northern Rhodesia is more essentially tropical and is scarcely a white settler's country. Livingstone, the seat of administration till 1935, was replaced by the more centrally placed Lusaka. The European population of 10,000 (compared with 1,400,000 natives) is found largely along the railway from the Victoria Falls to the Belgian Katanga.

Mines of lead and zinc are worked on the section of the 'Cape-to-Cairo' railway at Broken Hill in about 14½° S. Good cotton has been grown in this division. Northern Rhodesia is still very undeveloped; much fine ranching country exists and will doubtless be developed gradually. The chief settlements of the Barotse (capital Lealui) are in a low-lying, marshy, and unhealthy but fertile valley on both banks of the Zambezi, where that river flows from north to south, a valley about 150 miles in length by 25 in width, annually inundated during the rainy season, which lasts from the end of November to March or April. Iron ores of high quality abound in this and the neighbouring valleys.

TROPICAL AFRICA

This is the part of the continent that yields least to commerce, and much of it affords little prospect of yielding much more in the near future. Oil and oil-seeds, ivory, rubber, gums, and spices until recently made up the bulk of the exports from these regions, and the total value of them, especially of the last two, was small. These products were largely, if not mainly, obtained by the system known to the Germans as 'robber-economy,' the system that destroys what furnishes the product, so that one has to penetrate to a greater distance inland in search of commodities of which the regions first visited have been denuded. The regular cultivation of products for export is confined to very limited areas.

The causes of this state of affairs are various. Until the present century, only over a comparatively limited area was there a strong settled government. The most conspicuous exception to this general statement was that offered by the native states between the Niger and Lake Chad, more particularly the great Hausa states of Sokoto, Gandu, and Adamawa, as well as Bornu. More or less civilised communities have existed there for hundreds of years, though the Fula dynasties now reigning in the Hausa states have held sway there only since the beginning of the nineteenth century. Their sway is vigorous, but till the British intervened, its advantages

were greatly reduced by the fact that it countenanced slave-raiding. You might travel, according to Mr. J. Thomson, as safely through the Hausa states as through Great Britain. The air is dry and exhilarating, though the temperature is high. The soil is much more fertile than is commonly the case in Africa. The rains are adequate. The fields are consequently well cultivated, and produce abundance of durrah, maize, cotton, and other crops. The horse, camel, ox, and donkey flourish. There are large towns, with a population in some cases of as much as 150,000. The people are expert in many handicrafts, including the working of brass and other metals. They are fond of voluminous garments, and delight in adorning even their horses with silks and velvets, tassels, and tinkling bells.

Here it may be noted that these states are all Mohammedan, and that it is apparently since the introduction of Mohammedanism that the civilisation just described reached its present stage of development. Mohammedanism has, in fact, hitherto proved the most powerful civilising agent in central Africa. Its influence is still spreading, and it has already conquered the whole area from the Atlantic to the Indian Ocean as far as 6° N. latitude, and in some parts even further south.

On the other hand, the slave-trade, as practised till a recent date by the Arabs, the people among whom Mohammedanism arose, was perhaps the chief hindrance to the establishment of settled government in central Africa, and the second great obstacle to the development of trade with that region. Throughout the greater part of this region Arabs carried on the trade in ivory and the trade in slaves hand-in-hand. They went wherever ivory could be accumulated, and when they had collected their store of this valuable commodity they seized or purchased natives to serve as bearers, and finally to be sold as slaves.

Thirdly, the climate of central Africa is an obstacle to its development. The climate, like that of tropical regions, is enervating and unfavourable to labour. On all the lowlands malaria prevails, and it is not even absent from the tropical plateaus. Among Europeans this caused a serious mortality until its cause and prevention were revealed through the researches of Sir Ronald Ross, and natives do not escape it. West Africa was long known as the 'white man's grave,' but now the expectation of life of the Europeans domiciled there is actually greater than in Europe. Over a large part of tropical and in the east sub-tropical Africa, between about 15° N. and 17½° S. in the west and 4° N. and 27½° S. in the east, range the various species of tsetse fly (*Glossina*), several of which have been proved to introduce fatal diseases into the bodies of both man and the larger domestic animals, principally cattle and horses. From most of them, however, the open grass country is

free. Cattle and horses have also suffered greatly from ticks, not merely within the tropics but far south of the Tropic of Capricorn, but these diseases have now largely been brought under control.

Fourthly, the soil of central Africa is often far from fertile. Large areas of the plateau of eastern Africa are very barren. The fertile volcanic soils in the neighbourhood of Mounts Kenya and Kilimanjaro, east of Lake Victoria Nyanza, are rather an exception, and even there the country is burnt up for eight or nine months in the year. Vast areas in the Congo basin and elsewhere are covered with poor tropical red soils, including laterite, from which the valuable plant foods have been leached by rain.

Fifthly, the means of communication with the interior are defective, though improving. On the north, the great desert of Sahara intervenes between the Mediterranean and North Atlantic seaports and the Sudan, and in the east there are deserts of greater or less width everywhere north of the equator, between the coast and the more fertile highlands of the Nile basin.

The navigation of nearly all the great rivers is interrupted by rapids and falls. Above the limit mentioned on p. 654 the Nile navigation is interrupted for more than a degree of latitude before Lake Albert Nyanza is reached, and long stretches of the Victoria Nile between the Victoria and the Albert Nyanza are also unnavigable. The lower half of the Senegal is navigable for gunboats, but the upper half is obstructed by numerous difficult rapids, some impassable for the greater part of the year. The extensive navigation of the Niger basin is of much more importance than that of any other African river except the Nile, regard being had to the situation of the most productive regions belonging to it. Vessels of 600 tons can ascend for seven or eight months in the year as high as Rabba, a little above the confluence of the Benue. There navigation is almost wholly interrupted by a long series of rapids, and even above those rapids the navigation is very difficult as high as about 15° 40′ N., but above that point the Niger is navigated for hundreds of miles. The Benue, the great tributary of the Niger, which traverses the southern part of the Hausa states, is navigable to about 13° E., that is, for nearly the whole of its western course. The Congo is navigable for ocean vessels to Matadi, ninety-three miles from its mouth, but for the next 226 miles, where it breaks through the African plateau, is unnavigable. There follows, however, a stretch of 1,044 miles of uninterrupted navigation between the outlet of Stanley Pool and Stanley Falls, situated just above the place where the river first crosses the equator. Above that again there is an unnavigable stretch of ninety-seven miles, followed by 196 miles of navigation between Ponthierville and Kindu, then another obstructed tract of 202 miles, above which, between Port

d'Enfer and Kalengwe, there is a final navigable stretch of 398 miles. A railway, opened in March 1898, avoids the rapids and falls between Matadi and Leopoldville on Stanley Pool. Construction of a canal between Matadi and Leopoldville at a cost of £4,000,000 has been proposed with a view to relieving the congestion on the railways. A 4-inch pipe-line, for the purpose of transporting crude oil for the use of river steamers, was constructed from Matadi to Leopoldville (1913), where there are a floating dock, several large slipways, and ample facilities for construction and repairs. The great tributaries on the left bank of the Congo all have their navigation stopped between about 5° and 6° S.; and the Ubangi, the most important tributary on the right bank (now proved to be the lower course of the Welle), has somewhat difficult rapids in 4° 20′ N. Many small steamers and motor boats now ply on the upper Congo and its branches, including those possessed by the Belgian Administrator, and large numbers by private firms, including the Niger Company (United Africa). As a result of the opening of the Belgian Congo to free trade in 1912 and the abandonment of the government monopoly in rubber and ivory, the government steamers had to make the return journey empty, for traders could not afford to pay the high freights charged. The freight rates were consequently reduced 50 per cent. The Zambezi, the only great river on the east side of the continent, not only has impassable rapids in its lower course (about the place where it turns to the south-east), but till quite recently it was not known to have any mouth without a shallow bar. The Shire, the tributary on the left bank which forms the outlet of Lake Nyasa, has its navigation interrupted by a cataract about midway between the lake and the Zambezi, and is navigable only by boats drawing no more than 18 inches—the largest of about 40 tons burden.

Before the beginning of the present century roads fit for wheeled vehicles, motors, and railways were scarcely known. The only means of carriage available in the greater part of this region were thus pack animals and human carriers. Even yet the old-established routes of central Africa, though forming an intricate network connecting every village, are mere beaten tracks of small width, tracks which, however, have proved very suitable for bicycles.

The beasts of burden most in use are, or were, the camel, the indispensable carrier of the desert, and the ox. A camel caravan takes about three months to cross the Sahara by the shortest and easiest route from central Sudan to the Mediterranean—that, namely, by the oases of Fezzan to Tripoli. The average rate is thus about fifteen to eighteen miles a day. A caravan of human porters, where this method of carriage is best organised, as in Portuguese Africa on the west coast, travels at the rate of from eighteen to twenty-three miles a day, each porter bearing a load of about

50 lbs., in some cases as much as 120 lbs. The ox will bear a load of about 150 lbs. on an average, but the use of this beast of burden is prevented throughout a large part of the region now described by the occurrence of the tsetse fly. The Indian elephant was tried in African exploration with indifferent success.

The great changes in transport in Africa have taken place largely since the War. Not only have considerable lengths of railway and modern road been constructed, but the motor lorry and the motor bus have invaded all the drier areas though the 'roads'—mere tracks—are usually impassable in the wet season. Regular motor services cross the Sahara in two or three days and motor trucks make a journey from the Cape to Cairo an easy task. The aeroplane is familiar both on its regular routes such as Imperial Airways from London to Cape Town and also in many of the remoter parts of the continent.

French West Africa. French influence prevails over the greater part of the north-west of Africa. The French colony of the Senegal now confines to a narrow strip the British settlements on the Gambia, at the mouth of which stands Fort Bathurst. The Gambia is the main line of internal communication and is navigable for ocean-going steamers for 200 miles, in all seasons. A coast railway has been laid in French territory (from St. Louis, the capital, to Dakkar at Cape Verde), and a railway connecting the navigation of the Senegal with that of the upper Niger at the end of 1923. The portion between Kayes and the Niger is of far-reaching value to the territory, and since its completion the prosperity of the colony has rapidly increased. The French have a far-reaching scheme for further railway construction in French West Africa which will include the linking together of the railways already existing in the various colonies. The region supplies chiefly ground-nuts, sesame, palm-kernels, and other oil-seeds to the market of Marseilles. The rearing of cattle and sheep is one of the most important occupations in the territory. The greater part of the export trade is with the coast colonies. At Bamako, a factory for meat extracts, preserves, and animal by-products has been built, and it is estimated that when in full activity it will be able to deal with 30,000 to 40,000 head annually. Gold is found but not exploited to any extent. Timbuktu, situated at the distance of a few miles from the upper Niger, but far below the point of junction of the railway, formerly the chief centre of the caravan trade on the southern borders of the western Sahara, has lost much of its importance. Among other commodities in which trade is carried on is salt, which is obtained at Taudenit, 260 miles north of Timbuktu, and is almost wholly wanting in the Sudan. French Guinea surrounds the British colony of Sierra Leone on the north and the interior, and on the east follows the native republic of Liberia. All the Ivory Coast,

with the ports of Grand Bassam and Abidjan, is now in French hands. The former German colony of Togoland, now administered by England and France, next follows with the seaport of Lome, and then the French protectorate of Dahomey, with those of Porto Novo and Kotonou.

British West Africa. The small tract of **Gambia** has already been mentioned. Next among the separated tracts of British territory comes **Sierra Leone.** Here palm-oil, palm-kernels, kola-nuts, and cacao begin to predominate as they do all along the coast from Sierra Leone to the mouth of the Congo.

Freetown, the capital of Sierra Leone, is on the Rokelle River, the broad estuary of which forms an excellent harbour. The town was formerly very unhealthy, but the danger to the white population has been mitigated by sanitation and precautions against mosquitoes.

Although along the whole of the coast-line of upper Guinea from Liberia eastwards the prevailing winds all the year round are from the sea, these winds frequently give place in the early months of the year (January to April), when the southern seas are at their highest temperature and the inland parts of north Africa coolest, to a strong northerly, exceedingly dry, dust-laden wind, the harmattan, cool in the morning and evening but very oppressive during the day. The dust is blown in large quantities seawards, which quite accounts for the shallowness of the sea, the uniformity of the surf-beaten coast-line, and the absence of natural harbours, as well as the fact that the mouths of the rivers and the entrances to the coast lagoons are encumbered by bars. The flat coast-strips tend everywhere to be unhealthy.

The British colony of the **Gold Coast,** with the protectorate of Ashanti, comes next. Gold is now second only to cacao amongst the exports ; diamonds were discovered in 1919 and a very large export has been reached, and there are large deposits of manganese ore. The export of cacao, which was less than a thousand tons in 1891, had increased to 90,000 tons in 1919. In 1924 the then record figure of 225,000 tons—roughly half the world's total—was reached, representing 75 per cent. in value of the total exports (£7·2 millions out of £9·9 millions). The export reached 238,000 tons, valued at £9·7 millions in 1929, and this quantity though lower in value has been maintained. By the construction of a breakwater 7,500 feet long, enclosing water with a depth of 20 feet, a harbour has been opened at Takoradi, four miles from Sekondi. A railway runs from Sekondi in the west to Kumasi (198 miles) through the gold-mining Tarkwa district, another from Accra in the east to Kumasi, and a new line links up Kade in the east to Huni Valley and Takoradi in the west. Cape Coast Castle is still without a railway.

Nigeria. To the east of Dahomey lies the British colony of

Nigeria, one of the most promising regions in the continent, divided for administration into the Northern and Southern Provinces. The seat of the government is the once unhealthy, but now attractive, town of Lagos which was acquired from a native king in 1861. Northern Nigeria is the part containing the most civilised communities and the most populous industrial and commercial towns.

NIGERIA

GENERAL IMPORTS

—	Percentage of Total Value.				
	1921.	1926–30.	1931–35.	—	—
Foodstuffs:					
Fish	4·1	4·9	4·5		
Rice	1·1	1·4	1·2		
Kola-nuts	5·6	3·3	0·6		
Salt	2·4	2·2	3·1		
Tobacco and cigarettes	4·0	4·2	5·3		
Raw materials:					
Mineral oils	2·15	4·0	4·4		
Chemicals, drugs, colours	1·1	1·8	2·9		
Manufactures:					
Cotton goods	30·0	27·8	31·9		
Bags and sacks	2·4	2·2	3·5		
Apparel and hats	1·8	2·1	2·1		
Other yarns and textiles	1·7	2·0	1·9		
Manufactured wood	4·5	2·7	2·3		
Iron and steel	7·0	9·5	7·7		
Vehicles	2·9	5·5	4·9		
Machinery	1·8	2·9	1·5		
Total in million £	*12·9*	*14·2*	*6·8*		
Countries:					
United Kingdom	72·8	70·3	67·2		
Germany	6·4	9·5	7·0		
United States	6·4	8·1	7·0		
Netherlands	3·3	3·5	2·4		
France	0·7	1·9	1·5		
Gold Coast	6·0	2·1	0·5		
Sierra Leone	0·6	0·9	0·4		

The Hausa are by all accounts the most vigorous race in West Africa, remarkable for their physical strength. Their language is estimated to be spoken by about 15,000,000 people, and is a *lingua franca* for a wide region. Of the towns, none of which is at a greater altitude than 2,500 feet, the most important is the mud-walled city of Kano, noted for hundreds of years as the place of manufacture of cottons and fine kinds of leather (including Morocco leather), which are sold in every part of north Africa. This fact in itself

appears to warrant the expectation of a greatly extended commercial development with improved means of communication. A great variety of European goods formerly reached it from the Mediterranean. As many as 12,000 camel-loads are said to have been brought thence annually to Kano, but that probably indicates at most about 2,000 tons. The development of all this region in the past has been hindered mainly by the extreme unhealthiness of the coast, the inadequacy of the communications with the interior, and the ravages caused by the practice of slave-raiding. This was

NIGERIA

GENERAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs :					
Ground-nuts	11·5	12·8	20·3		
Cacao	6·8	12·1	14·1		
Palm-kernels	21.0	26·2	22·8		
Raw Materials :					
Palm-oil	27·4	21·9	15·0		
Hides and skins	3·9	4·9	7·5		
Cotton lint	5·3	3·7	2·6		
Tin ore	10·8	12·7	10·3		
Total in million £	*14·4*	*14·2*	*10·3*		
Countries :					
United Kingdom	61·7	46·4	45·8		
Germany	19·6	22·7	15·8		
United States	5·4	8·1	9·1		
Netherlands	5·5	5·6	8·5		
France	3·3	6·6	11·5		
Italy	2·4	3·0	3·9		
Gold Coast	0·9	1·9	1·2		

abolished throughout the Protectorate in 1917. The waterways of the Niger and Benue unfortunately do not serve as means of communication with the most populous and civilised parts of that region, these lying in the higher grounds towards the north at some distance east of the Niger, but these are now linked directly by railway with both Lagos and Port Harcourt.

The agricultural exports of Nigeria are at present mainly derived from the forests immediately behind the ports—palm-oil and palm-kernels being among the chief. Cacao plantations were fostered by the government, and native instructors give curing demonstrations, so that Nigeria is second only to the Gold Coast as an exporter of cocoa. The export of raw cotton from Lagos increased from 290,000 lbs. in 1903 to 7,447,000 lbs. in 1916 and 19,500,000 lbs. in 1924–25. The yearly variations are accounted for partly by

climatic conditions and partly by competition of other crops of a more speculative nature. Thus in 1929 the export was 13,100,000 lbs. The cotton is of good average quality, and its cultivation is being actively encouraged. The chief obstacle to expansion, however, is that there are few adjacent lands suitable for planting. The main trade artery, leaving the Niger out of account, is the railway from Lagos to Zaria and Kano, the capitals of the northern cotton region (705 miles). The railway from Port Harcourt to Kaduna was opened in 1926. There is a train-ferry on this line across the Benue. The extension of these lines to Lake Chad would open vast possibilities. On the left shore of the lake is a rich strip of land exactly similar to that of the Sudan cotton districts. Here the cotton crops would not be exposed to the vagaries of the rainy season, for annual inundations to a depth of six miles inland would make irrigation easy and possible. Labour difficulties would also be fewer. Much actually has been done to open this area by the use of motor lorries. Ground-nuts now form a very important crop in Nigeria and are grown on the plateau. Rich alluvial deposits of tin occur on the Bauchi plateau around Naraguta. These were opened up especially during the War, and there has been an average output representing nearly 6,000 tons of tin for over ten years. The ore-bearing area is of wide extent. A colliery, which has been opened since 1916 by the government at Udi in the Southern Provinces, is connected by rail with Port Harcourt on the Bonny River. The greater part is used by the railway and other government services, the balance being sold to ships visiting Port Harcourt. Gold is also mined near Mimra in the Niger Province.

Lagos, the chief port and capital town of Nigeria, stands on a small island within a lagoon the entrance to which has a shifting bar with a depth formerly varying from 9 to no more than 15 feet, so that large vessels had to load and discharge outside on a somewhat dangerous coast. At great cost the harbour was extended in 1918, and dredging operations carried out that year permitted the bar draught to be raised to 21 feet. The importance of Port Harcourt has been greatly increased by the construction of the railway northwards. Akassa, at the mouth of the main stream of the Niger, suffers from the same defects as Lagos, but Old Calabar or Duke Town in the east of Southern Nigeria has a deep and commodious harbour.

French Equatorial Africa and the Belgian Congo. Adjoining Nigeria from the coast to Lake Chad is the Cameroon Protectorate (formerly German), now administered by Britain and France, yielding similar forest products, along with coffee and cacao grown on the slopes of the Cameroon mountain. Victoria, where vessels of 14-feet draught can lie alongside the jetties, is the chief port.

This protectorate is followed by the French Congo Territory, extending from the coast to the Congo and the lower part of the Mobangi. The resources of this territory are largely undeveloped. Corisco Bay, in the north of this region, is a Spanish possession. The whole of the coast south of the Congo as far as the river Kunene belongs to Portugal, and so too does a small portion to the north of the Congo. The land on the northern side of the estuary of the Congo, together with the greater part of the Congo basin east of the Ubangi, belongs to the Congo Territory, which existed from February 1885 to February 1909 as the Congo Free State under the rule of the King of Belgium, but was annexed at the latter date to the Belgian kingdom, with the result, it would appear, of bringing about a great improvement in the system of government.

By the international treaty under which the Congo Free State was founded no import duties could be levied by the state, but this provision was annulled in 1890, and there is now a common import tariff with the adjoining French and Portuguese territories. Steamers are maintained by the state above and below the falls. There was at first a great increase in the export of rubber, which has since declined and is now negligible. Other vegetable products include gum gopal, palm-oil, and palm-kernels. The district of Katanga, an elevated region (4,000 to 7,000 feet above sea-level), in the south-east of the state, belongs geographically to Rhodesia rather than the Congo. This district is a copper country; its southern copper belt extends for a distance of 200 miles, with a breadth of from 35 to 60 miles. It was estimated in the early days of exploitation that 40,000 tons of metal and matte would be produced annually, in which case Katanga would be one of the most productive copper-fields in the world. In 1911 the production of copper was 1,000 tons, and in 1929, 135,000 tons,[1] thus far exceeding original expectations. Iron-stone and lime are also obtained in close proximity to the copper mines, and gold, iron, tin, and diamonds are worked. Most of the labour for the mines has hitherto been recruited from Rhodesia and Portuguese territory, and some also from Northern Nigeria, but now that the railway has been completed to Bukama on the Lualaba, 2,600 miles from Cape Town, recruits and food supplies have been partly drawn from the north. In this district a great deal of labour has been expended on the construction of roads. Although this district is extremely fertile, its great distance from the sea and the smallness of its white population have prevented the exploitation of its vegetable wealth. Stock-raising is successfully engaged in and offers a promising future, especially since the completion of the railway through Angola to Lobito Bay. Boma is the administrative capital of the Belgian Congo and the port for the Mayumbe region, but has no ship-

[1] 108,000 tons in 1935.

building facilities. Matadi, nearly 100 miles from the coast, is the port for the whole of the interior, and can be reached by ocean-going vessels. Above Leopoldville the chief towns are New Antwerp (formerly Bangala), situated about the point where the course of the Congo changes from westerly to southerly, and Elisabethville, the metropolis of Katanga.

Angola. The Portuguese territories south of the Congo and within the drainage area of the Congo River comprise some of the finest land in tropical Africa. There are large districts in the north more than 5,000 feet in height, and consequently with a climate almost European. The three seaports of Loanda, Benguela, and Mossamedes (the first and last with two of the finest natural harbours on the west coast) give name to three provinces, and a few miles to the north of Benguela, in 12° 20′ S., a fine natural harbour is formed by Lobito Bay, the terminus of the Benguela railway. The Benguela-Lobito railway from Lobito to the Katanga copper district is over 1,400 miles in length (completed 1931). It is due largely to the enterprise of an Englishman, who was granted a concession by the Portuguese Government in 1902. It reduces the distance from London to Elisabethville to 6,457 miles, as compared with 8,480 by Cape Town and 8,890 miles by Beira and the shortened railway thence through Broken Hill. Diamonds were discovered a few years ago and have rapidly become important. The Kwanza, the chief river in the north, is navigable for 200 miles (to Dondo). The seaboard abounds in fish. Salt is extensively worked on the coast between Quisembo and Ambrizette.

Portuguese East Africa. In East Africa the Portuguese have for hundreds of years claimed authority over the coast from Delagoa Bay to Cape Delgado. The limit of their authority in the interior was, however, undefined till 1891, when a treaty was concluded with Great Britain fixing approximately the common boundary of the sphere of influence of these two Powers. Under this treaty the Portuguese territory north of the Zambezi embraces both banks of the lower Shire, and a large area as far west as the Loangwa (about 30° E.). In accordance with the Treaty of Versailles, the Peace Conference (1919) allotted to Portugal the territory south of the Rovuma, known as the 'Kionga Triangle' (formerly part of German East Africa). South of the Zambezi the boundary lies for the most part to the east of 33° E. The fine harbour of Beira, at the mouth of the Pungwe River, accommodating at spring-tides the largest ships, is now the port of Southern Rhodesia. A little to the south is the old port of Sofala, visited by Arabs even in the Middle Ages. Chinde, at the mouth of the most easily navigated branch of the delta of the Zambezi, having a depth on the bar varying from twelve to eighteen feet, has now quite superseded the old port of Quilimane (Kiliman). Mozambique, further north,

has a small local trade. The Inhambane district to the north of Lourenço Marques forms a great recruiting centre for labour for the Transvaal. The chief products are sugar, copra, and bees-wax. Gold deposits have been discovered on the Zambezi, and coal is worked on a small scale about 20 miles above Tete. The long-projected railway from Beira to the Zambezi and from the Zambezi to Blantyre in Nyasaland was opened in 1922, and the Zambezi itself is crossed by the Lower Zambezi Bridge at Sena. The line is on the 3 feet 6 inch gauge and has since been extended to Chipoka on Lake Nyasa, 496 miles from Beira.

Nyasaland. The Nyasaland Protectorate, or British Central Africa, as it was formerly called, is a territory, under direct British administration, lying west and south of Lake Nyasa, and including the islands in that lake, and traversed in the south by the Shire River, along which it stretches on the left bank to the Ruo, and on the right bank to within a few miles of the Zambezi. This region was opened up by British missionaries and the African Lakes Company (also British) many years before it was proclaimed a British protectorate in 1891. On the Shiré Highlands east of the middle Shire stand Blantyre, the chief station of planters, and Zomba, the seat of administration. Coffee of excellent quality was at one time the chief plantation product; after 1900 the production declined but has again increased. The government is fostering native agriculture and cotton is now a promising crop ; tobacco, from American seed, is also grown with success, and now over 10,000,000 lbs. are exported. Roads suitable for ox-wagons are plentiful in the Protectorate and *via* the Great North Road there is a route to Kenya for motors. With the exception of the Shire valley and strips along Lake Nyasa and the brackish Lake Chilwa nearly all the territory is above 3,000 feet in height. The Mlanje Mountains south of Lake Chilwa are above 8,000 feet in height, and near the north of the territory is a plateau called the Nyika Plateau, about 1,200 square miles in extent, with an average altitude of 7,000 feet, on which it might be possible for European colonists to thrive. The Kivu plateau with an altitude of 8,500 feet has a delightful climate suitable for Europeans. It is not infested with ants or mosquitoes. In 1934 there were 1,800 Europeans and 1,600,000 natives in Nyasaland.

Tanganyika. Tanganyika Territory, formerly German East Africa and now administered as a British mandate, extends from the River Rovuma northwards to Kenya Colony and westwards to Lakes Nyasa, Tanganyika, and Victoria Nyanza, and includes the island of Mafia. Good natural harbours for vessels up to about sixteen feet draught are afforded by the bays of Dar-es-Salaam and Mikindani ; Bagamoyo has only an open roadstead, and Tanga has a commodious and safe harbour entered by a broad channel from 30

to 48 feet deep. Dar-es-Salaam, the seat of administration, is the coast terminus of the Central Railway (780 miles), which runs to Ujiji on Lake Tanganyika and there links up by steamer with the railways of Belgian Congo. A branch line from Tabora to Lake Victoria has also been laid. In the north of the territory is another railway from Tanga to Moshi and joining the Kenya system. There are wide, well-kept roads throughout the territory where various tropical plantations have been established. The chief exports are henequen (sisal), cotton, hides, copra, coffee, ground-nuts, and wax.

Kenya. Kenya Colony is a British possession embracing all the area between the northern frontier of Tanganyika Territory and the southern frontier of Italian Somaliland, stretching in the interior to the Anglo-Egyptian Sudan on the north-west and Uganda on the west. The colony has a fertile, well-cultivated, but somewhat unhealthy coast strip producing rubber, copra, and other products. The north of the colony is dry and rather barren, but in the southern part of the interior are extensive tracts of healthy highlands well adapted for the cultivation of tobacco and even European grains and roots (potatoes), whilst the growing of cotton for export is rapidly becoming of great importance. Particularly favourable to European settlement are the climatic conditions round the base of Mount Kenya. Other important crops are coffee and sisal, and live-stock thrive well. The mineral resources have not yet been fully explored, but do not appear to be very great. Extensive deposits of natural soda have been discovered at Magadi in about 1° 50′ S., and 36° 15′ E., to which a railway has run since 1913 from the 281st mile of the Uganda railway, descending 4,000 feet within a short distance from its summit level of about 6,000 feet. Nairobi, the capital of Kenya, is a flourishing city of 47,000 people, including 5,400 Europeans. There were 17,500 Europeans in Kenya in 1934 (est.). Of the ports of the colony, Malindi or Melinde is historically interesting as that from which Vasco da Gama set sail for the coast of India in 1498, but the finest natural harbour on the coast, capacious and deep enough for the largest vessels, is at Port Kilindini, the ocean terminus of the Uganda railway, opposite Mombasa which is situated on a small island connected with the mainland by a bridge half a mile long. The railway just mentioned, running through Nairobi to Kisumu on Ugowe Bay, the easternmost arm of Lake Victoria Nyanza, was finished in December 1901. Kisumu has lost some of its importance as a lake port since the completion of the railway through from Kenya to Uganda which, since 1931, spans the Nile at Jinja to reach Kampala.

Uganda. The parts north and north-west of Lake Victoria Nyanza form the Protectorate of Uganda, which has much fertile land fairly healthy except in the lower grounds. In both Kenya and Uganda the estimated population is little more than twenty

to the square mile. The natives have probably greater property in cattle than in any other country in the world. Uganda cultivates cotton (by far the most important export crop), rubber, coffee, chillies, maize, wheat, and other cereals, sugar-cane, sisal, and oil-seeds. Horned cattle, sheep, and goats are raised. Labour is plentiful and, although requiring training and supervision, is above the average.

Zanzibar. The islands of Zanzibar and Pemba, forming a British Protectorate, are almost the last relics of an Arab sultanate which once held sway over the whole of the neighbouring coast, and to which a strip of ten miles on the coast still nominally belongs, though actually under British administration. The town of Zanzibar, on the west side of the island of the same name, has long been the chief centre of the trade in this region—a trade largely in the hands of merchants belonging to British India (Baniyas). On February 1, 1892, the port of Zanzibar was declared free, all customs duties except those on ammunition and strong spirits being abolished. Cloves are the chief commercial products of the islands, especially of Pemba.

AFRICAN ISLANDS

Of the African islands the largest is *Madagascar*, nearly a thousand miles long and a quarter of a million square miles in area. Discovered by the Portuguese in 1500, it came but little under white influence until the nineteenth century; in 1885 it became a French protectorate, and since 1896 has been under direct French administration. Its productivity is not so great as might be expected, for parts of the island are semi-arid and much of the soil on the plateau is poor. The chief crops are rice, manioc, maize, sugar, and coffee, and cattle are numerous. The capital is Antananarivo, on the plateau of Imerina in the interior, and the principal ports are Tamatave, on the east coast, serving the capital, and Mayunga, at the mouth of the Betsiboka river on the north-west coast. In the north-west is the fine harbour of Diego Suarez. The trade of the island, conducted for the most part with France, consists of exports of tapioca, rice and vanilla, hides, and graphite, and imports of textile and metal goods; but the volume is small considering the population of three and a half millions.

The *Comoro islands* (French), north-west of Madagascar, produce sugar, vanilla, and copra. *Réunion*, another French possession, is one of the richest of the African islands. One of the volcanic Mascarenhas, it rises to 10,000 feet and grows a variety of crops, of which the chief is sugar-cane, which, together with the rum distilled from it, is exported in large quantities.

Of the British islands, chief is *Mauritius*, greatly resembling

Réunion. Sugar represents over 80 per cent. of its total export trade in value; the plantations are worked almost entirely by coolies from India. The *Seychelles*, British since 1810 and a separate colony since 1903, lie about 500 miles north-east of Madagascar; they produce coconuts and cinnamon. *Socotra*, off the eastern extremity of Africa, is a British protectorate administered from Aden.

African islands in the Atlantic Ocean include the British islands of *Ascension* and *St. Helena*, now of little commercial value. The latter was, however, until the opening of the Suez Canal, an important coaling-station on the South African route; at present its most important product is phormium, a kind of flax introduced from New Zealand. The *Cape Verde Islands*, administered by Portugal, are likewise of little value, being very dry; but the harbour of St. Vincent is much used. The *Canaries* (Spanish) are a productive volcanic group, producing tropical, sub-tropical, and Mediterranean vegetables, fruit, and cereals. Early vegetables and bananas for the European market are exported. *Madeira* is also volcanic and very productive; wine and tropical fruits are exported, and there is a large tourist industry. The *Azores*, actually administered as a province of Portugal, and lying well out in the Atlantic, are usually included as 'African.' The islands are of volcanic origin, and have a population of nearly a quarter of a million. Cereals, fruits, including oranges and grapes, are produced, and the tourist industry flourishes.

AMERICA

America, the New World, is less than one-half of the aggregate size of the three great continents of the Old World—Europe, Asia, and Africa. Its population, numbering about 220 millions, is estimated to be made up of the following elements :— people of European origin, about 65 per cent. ; native Indians, about 16 per cent. ; negroes, 10 per cent. ; people of mixed race, 8 per cent. ; Chinese, natives of India, &c., less than 1 per cent.

The commerce of America taken as a whole has one striking feature, namely, the vastness of the scale on which it is carried on relatively to the density of the population. This arises from the mode in which America has been peopled, especially since the great improvements in the means of communication brought about in the course of the nineteenth century. The prevailing characteristic of the development of American resources is the rapid utilisation of cheap land by devoting it on a large scale to the production of the commodities for which, under existing conditions of commerce, it is best suited. Gradually, however, one country after another, especially since the Great War, is taking on the features of the countries of the Old World—the diminution in the surplus of primary materials available for export and the extension of secondary industries or manufactures. The United States has passed this stage and so, in a large measure, has Canada.

In consequence of this there has been, and to a large extent still is, a large preponderance of bulky articles (food-stuffs and raw materials) among the exports of the two continents, and this made it in general impossible to balance the outward with the inward trade as regards quantity. Large numbers of empty railway wagons had to be hauled to the producing regions of the interior. This was an inducement to the railway companies to reduce the inward rates of carriage to the lowest point, for it is obvious that in these circumstances anything earned over the cost of collecting, handling, and delivering the goods is a profit to them. In some cases, however, the conditions were reversed until the opening of the Panama Canal in 1914. The trade across the Rocky Mountains carried on by the Canadian Pacific Railway was larger inwards than outwards. Inwards were carried large quantities of lumber, shingles, and other

forest products of the Pacific seaboard, besides such less bulky articles as sugar, tea, and other products of the Pacific islands and the Orient. Since the opening of the Panama Canal, however, Vancouver has become Canada's premier grain port for the wheat of the Prairies.

The situation of the American continent about midway between the most populous and productive parts of Europe on the one side, and Asia and Australia on the other side, is likewise noteworthy in relation to American commerce. The advantage of this position has become more apparent as population has increased on the west side of the continent. Nevertheless, the western market of America is comparatively small, and such products as eastern Asia supplies are either obtained from other countries more favourably situated for the great eastern markets of America, or, in most cases, are imported by the longer, but unbroken, sea-route through the Panama Canal. Tea, for example, though imported into the United States almost exclusively from China and Japan, enters that country mainly by eastern ports. In 1925 as in 1886 only about one-tenth of the whole was introduced by way of San Francisco and other ports on the Pacific. The most important eastern product the greater portion of which is introduced into the United States by western ports is raw silk. Raw silk is valuable in proportion to its bulk, and therefore best fitted to bear the cost of land-carriage.

In North America the shortest trans-continental line north of the Gulf of Mexico is in Canada. Till 1915 the only railway that had a through line there was the Canadian Pacific (see below, p. 708). The wheat of the Prairies is the chief product carried eastwards by this route, and the arrangement of the long lakes Winnipeg, Manitoba, and Winnipegosis, west of the Great Lakes of the St. Lawrence, must force all the traffic from that region to the south of those lakes so long as there is not a sufficiently large body of settlers in more northerly latitudes to justify the laying of a railway running from west to east to the north of the lakes. The Lake of the Woods further east confines the traffic to the narrow belt between that lake and Lake Winnipeg, or forces it southwards into the territory of the United States through which the old Canadian Northern Railway passed for a short distance. That is why most of the lines of the Canadian Prairies converge on Winnipeg, and why the town has grown with such rapidity.

There are several routes from the eastern seaboard to the interior of North America which run partly through Canada and partly through the United States. The short line of the Canadian Pacific through Maine is mentioned below (p. 709). The Sault Ste. Marie-Minneapolis branch of the same railway is re-connected with the main line a little to the west of Regina by a line which re-enters Canada at Portal, and which brings down vast quantities of Canadian

wheat to be milled at Minneapolis. From Montreal to St. Paul (adjoining Minneapolis) by this route the distance is 1,119 miles, and to Vancouver 2,930 miles. By the connection with Chicago, effected by means of a tunnel under the St. Clair River between Sarnia and Port Huron, Montreal is 849 and Portland, Maine, 1,146 miles from Chicago. By another route New York is connected with Chicago by a line which passes over the Niagara River at Buffalo into Canada, and then re-enters the United States by Windsor and Detroit.

The trans-continental lines which lie entirely within the United States have to cross both the Appalachian system and the Rocky Mountains, which necessitate great windings and steep gradients. In the east railways on both flanks of the Hudson run northwards for more than 140 miles to take advantage of the same breach in that system, the Mohawk valley, as is made use of by the Erie Canal in proceeding westwards to Buffalo and Chicago (New York Central). This deviation raises the distance between these two points to upwards of 980 miles. A shorter route by the Pennsylvania Railroad, 912 miles in length, connects the two places by way of Philadelphia (90 miles) and Pittsburgh (444 miles), but in one part this route has an average gradient of 1 in 60 for 11 miles, and has one curve so sharp that rails weighing 110 lbs. to the yard have been worn down to 82 lbs. in fourteen months. Windings and heavy gradients also occur on the routes between Boston and Buffalo, the windings being such that even on the route through the Hoosac Mountains the distance by Buffalo to Chicago is about 40 miles greater than that of the routes from New York through the same town.

The termini both of the West Shore line running up the right bank of the Hudson and of the line belonging to the Pennsylvania Railroad Company through Philadelphia to Chicago formerly had to be reached by ferry from New York, but a large terminal station was constructed to the Pennsylvania Railroad Company in the heart of the city and tunnels have been pierced under the harbour to connect the city, including Brooklyn, with the New Jersey shore. These tunnels, however, serve only for passenger traffic. A vehicular tunnel under the Hudson has also been completed, in addition to the George Washington Bridge. The New York Central Lines have been brought into the very heart of New York by tunnels through which the trains are drawn by electric engines.

The connection of Chicago, and thus of the eastern seaboard with San Francisco (or rather with Oakland on the east side of the Bay of San Francisco) by the completion of the Union and Central Pacific Railroad, through Des Moines and Omaha, was effected in 1869, and this was the first trans-continental connection north of the Isthmus of Panama. The total distance by this route between New York and San Francisco is 3,270 miles by the Phila-

delphia route, 3,338 miles by Buffalo by a southern loop—the Denver and Rio Grande Railroad—with the Union Pacific Railway at Ogden, east of the Great Salt Lake, and by this route is 1,611 miles from San Francisco. Towards the end of 1909 a new trans-continental connection was established by the opening for freight traffic of the Western Pacific Railroad. Though this line has easier gradients than the Central Pacific, it is considerably longer.

The Northern Pacific and the Great Northern railways, whose routes are likewise shown on the map, both have for their eastern terminus St. Paul, 410 miles by rail north-west of Chicago. The distance by the Northern Pacific from St. Paul to Tacoma, on Puget Sound is 1,912 miles, to Portland 2,056 miles, those from New York by Philadelphia 3,234 and 3,378 miles respectively. By the Great Northern Railway the distance of Seattle, on Puget Sound, from St. Paul is 1,823 miles, from New York 3,145 miles.

The Atchison, Topeka, and Santa Fé railway and the Southern Pacific both establish connections with San Francisco by way of the southern half of the Californian valley. The former completes a trans-continental connection by way of St. Louis, where the Mississippi has been bridged since 1874. By the shortest railway connection with the Santa Fé system this city is 2,395 miles from San Francisco, while it is 1,063 miles from New York by way of Philadelphia, Pittsburgh, Columbus, and Indianapolis; but the shortest connection of St. Louis with the eastern seaboard is that with Baltimore, by Cincinnati, a distance of 920 miles. The Southern Pacific connects San Francisco through Los Angeles with New Orleans (2,489 miles) and Galveston (2,183 miles).

Only a comparatively small number of commodities are conveyed by these trans-continental lines from the western to the eastern seaboard. Great quantities of Californian fruit and of hops and apples from Oregon, Washington, and British Columbia are carried far eastward by rail and even for export to Europe. The large timber of British Columbia and the States of Washington and Oregon is now carried largely through the Panama Canal. The great bulk of the commodities conveyed over these lines are the products of the Prairies east of the Rockies—living animals (mainly for the slaughter-houses of Chicago), grain to the lake-ports of Chicago, Duluth, Superior, and Fort William, or for farther transport eastwards by rail, and other agricultural products, besides ores and metals from mines in the mountains. Westwards are carried chiefly coal and manufactured goods, but in Canada the export of grain through the permanently ice-free port of Vancouver has become increasingly important. Before the opening of the Panama Canal considerable quantities of Hawaiian sugar were imported at San Francisco to be again despatched by sea at Galveston for eastern ports, but this was exceptional. It is for this kind of traffic,

however, that the Tehuantepec railway (the international importance of which largely disappeared with the opening of the Panama Canal), the Panama railway, and the Panama Canal are designed. An important advantage of all these last connections between the Atlantic and Pacific is the fact that the great circle route from their Pacific termini to Japan and northern and middle China nearly follows the trend of the coast of North America as far as California, and even San Francisco is not very far out of such a direct course. On the Atlantic side again there is the advantage that from Bishop's Rock, Scilly Isles, at the entrance to the English Channel, the route is not greatly lengthened for the Atlantic termini of the Panama Canal by a call at one or other of the eastern ports of the United States. The direct route from Bishop's Rock to Colon is 4,356 nautical miles; the route by Hampton Roads little more than 250 miles farther.

As yet the only trans-continental railway route in South America, unless we include that from Buenos Aires through north-western Argentina and Bolivia to Arica or Antofagasta in Chile or through Bolivia with a steamer link across Lake Titicaca to Mollendo, is that which connects Valparaiso in Chile with Buenos Aires, with a length from sea to sea of 883 miles, opened May 25, 1910, but destroyed by flood in January 1934. Between Los Andes on the Chilean side of the mountains and Mendoza on the Argentine side it passes beneath the Uspallata Pass in a tunnel nearly two miles long with a summit level of 10,469 feet. The mountain section of this railway, 153 miles in length, is on the metre gauge, the remainder on the Argentine standard gauge (5 ft. 6 in.).

The opening of the Panama Canal in August 1914 brought about many changes in ocean routes, and, contrary to the expectations of many, the traffic through it now exceeds that through the Suez Canal. Yet the Panama Canal would not seem to have such fundamental advantages as the Suez Canal. This latter canal greatly shortened all the voyages between the most important parts of the East and West, the West including the eastern seaboard of North America. In a minor but still important degree, it also shortened the distance from Australia to Europe. A careful study shows, on the other hand, that the Panama Canal effects no shortening of distance between Europe and the East or Europe and Australia. It does not even make the distance from New York to Shanghai, that is, the Yangtze valley, shorter than that from Liverpool or London by the Suez Canal. It might be thought also that the shortening of distance from New York to Shanghai by some six hundred miles would not suffice to divert much of the traffic between these ports from the advantageous route by Suez. But its most important effect was to bring the western side of America nearer to the Atlantic, and that side of America has, of recent years, greatly

increased its productivity. In 1919, the first complete year after the war, the gross tonnage that passed the canal was 7·47 million tons, less than one-third of that which passed through the Suez Canal in 1914 (26·87 million tons). Down to 1923 the tonnage passing through the Suez Canal remained in excess of that passing through the Panama Canal, but in the year ending June 30, 1924, the net tonnage that passed through the Panama Canal was 26·15 million net tons (an increase of 7·5 million net tons over the preceding year) against 22·43 million net tons through the Suez Canal in the calendar year 1923. This rapid increase in traffic through the Panama Canal has been due mainly to the growth of the carriage of Californian oil to the Atlantic side. This commodity now takes the first place among those using the canal, followed by Puget Sound lumber, and in less quantity by wheat, China tea, Chilean nitrate and Australian meat. In the year ending June 30, 1930, 6,185 vessels of 30,000,000 tons passed through the canal with 27,000,000 tons of cargo. It is interesting to note that no less than 20,600,000 tons of cargo were carried from the Pacific to the Atlantic, against 9,500,000 in the reverse direction. Recently the cargo tonnage in the one direction has averaged about 17,000,000 against 6,000,000 in the other.

A great change has been effected in the North American continent by the development of concrete motor highways. The United States has more than half the total number of motor vehicles in the world and by 1934 there were several good motor highways from coast to coast. In each case a short length of each route remained to be adequately metalled and Canada has not yet a coast to coast highway. In South America a route, practicable for motors, crosses the Andes by the Uspallata Pass, close to the railway.

The American countries, especially the United States, have waged a constant war aiming at the conquest of distance. A most successful weapon has been the aeroplane. Regular air routes link all the larger cities and the journey from the Atlantic coast of the United States to the Pacific is covered in less than 24 hours. In South America, the regular services of the Pan-American Grace Airways (Panagra) encircle the continent and link its capitals with New York.

NORTH AMERICA

Including the West Indian Islands, this division of the New World comprises more than half the area and nearly three-fourths of the population belonging to the whole.

The surface is made up mainly of plains and tablelands, and the great mountain chains have a more or less southerly trend. In the west a series of lofty mountains stretch through the entire length of the continent, rising from a tableland, 4,000 feet or more in height, which at its widest (about lat. 40°) extends over fully one-third of the breadth of the United States, and east of the mountains slopes very gently downwards to a great plain. The mountain chain which rises above this tableland in the east is the Rocky Mountains, in the stricter application of that name. But this name is also applied more generally to include a great number of shorter mountain ranges, which vary the surface of the tableland, and nearly all of which trend north and south, or in a direction which does not greatly deviate from that. The Cascade Mountains and the Sierra Nevada are the principal mountain chains that border the tableland in the west, in the wider part of the continent; and still farther west are lower mountains, known as the Coast Range. Towards the south, in the narrower part of the continent, the tableland stretches almost from sea to sea. Several railways now cross these mountains. Those in the middle part of the system, where the traffic is most active, do so at passes varying from about 5,300 to upwards of 8,000 feet in height. The only other great mountain system of North America is that of the Appalachians or Alleghany Mountains, which extend in long parallel chains in the same direction as the Atlantic coast.

A chain of magnificent lakes, Lakes Superior, Michigan, Huron, Erie, and Ontario, is drained by the St. Lawrence into the Atlantic, and together with that river forms an invaluable means of internal communication, and the great rivers of the plain are, or at least have been, likewise of the highest service in this respect.

The general correspondence between the climate of the west of North America and that of western Europe, and between the climate of the eastern side of the continent and that of eastern Asia, has been referred to in the paragraphs relating to climate

generally (p. 23). Here two features in that correspondence may be recalled to mind—first, the more equable climate of the temperate zone in the west than in the east, and secondly, the dearth of rain in the west, south of the parallel of 37° or 38° N.; and it is only necessary to add some particulars regarding the effect of some of the great physical features on the climate of the continent.

Important climatic effects are due to the direction of the mountain chains. The western mountains, shutting off the moisture from the Pacific, cause a large part of the interior of the United States to be too dry for agriculture without irrigation. It is mainly from this cause that the greater part of the area of the United States west of 100° W., with the exception of a portion of the maritime strip, has this arid character (see p. 39). Further, the open plains and gently rising ground between these mountains and the Appalachians allow even the most southerly points of the United States, as well as the east coast of Mexico, to be swept from time to time by keen winds from the north, so that ice forms at the mouth of the Mississippi in lat. 30° N.; and even in the extreme south of Texas (lat. 26° N., about the same latitude as Patna in Bengal) as much as 14° of frost has been experienced. In the winter of 1885–86 a severe frost seriously injured a large proportion of the trees in the orange-groves of Florida, and the recurrence of frosts extinguished for a time orange-growing in all the Gulf States. Even below St. Louis ($38\frac{1}{2}°$ N.) the Mississippi navigation was partly closed by ice for $33\frac{1}{3}$ days on the average of the twenty-three years 1865–66 to 1887–88.

Other important effects on the climate are due to the great gulfs in the north and south, Hudson's Bay and the Gulf of Mexico, as well as the Great Lakes, the aggregate area of which is larger than that of Great Britain. Besides exercising through the agency of winds an equalising effect on the temperature, they are all sources of moisture, especially during the summer months, when moisture is most needed. It is in a large measure from this cause that north and east of the arid region of the continent the plains are supplied with rain enough at least for the growth of pasture grasses and other herbage. These plains form the prairies of North America. They are for the most part treeless, except the river banks, but experiments have shown that it is possible to extend the area of forests in this region, and in some places steady efforts are being made to do so.

Notwithstanding the great extent of the arid lands in the western half of the broader region of the continent, there is, according to Woeikof, the celebrated Russian meteorologist, no other part of the earth with a considerable rainfall during the summer months over so great an extent of territory in middle latitudes; and this circumstance explains in a great measure the success with which such crops

as maize, sorghum, and cotton are here cultivated over such wide areas.

For a long period after the discovery of America, the only important commodities furnished by North America were the precious metals derived from the West Indies and Mexico and cod from the Great Banks of Newfoundland. The West Indies and Mexico were entirely in Spanish hands. The feeble Indians of the islands were easily subjected at the time of their discovery in 1492 and the years immediately following, and the Aztec empire in Mexico was overthrown by Cortez in 1519–21. The mines of the precious metals in the West Indies were soon exhausted, but those of Mexico have never ceased to be extremely productive. Though the first English voyage to America, that which set sail from Bristol under the Venetian, John Cabot, in search of a north-west passage to India, was made in 1497, and though it was in virtue of that voyage that the English afterwards laid claim to a great part of the coast of North America, the first settlements in the temperate latitudes of that continent were made by the French. The banks of the St. Lawrence were explored by Jacques Cartier in 1533–43; but the most successful French settlements were due to the efforts of Samuel Champlain (1602–35). He founded Quebec in 1608, and a few years after his death Montreal was founded, in 1642. French explorations and a few isolated French settlements were made higher up, but the rapids above Montreal put a limit to continuous settlement by the French. All the territory on both banks of the St. Lawrence below Montreal continued to be French till the capture of Quebec by General Wolfe in 1759. Meantime settlements were made by other countries elsewhere. The first attempted settlement of the English was a failure. It was made on Roanoke Island in Pamlico Sound at the suggestion of Sir Walter Raleigh in 1585, but the survivors of the settlement were brought back to England by Sir Francis Drake in 1586. The first successful English settlement, known as Jamestown, was made in 1607 on a promontory of the James River, at the mouth of Chesapeake Bay. This former promontory is now an island in the river, on which the relics of the settlement are carefully preserved by the government of the United States. The next English settlements were made in Massachusetts—at Plymouth in 1620, and on Massachusetts Bay in 1628–30. In 1612 the Dutch began to trade at the mouth of the Hudson, a river ascended by the English navigator of that name when in Dutch service (1609), and in 1623 the first regular colony was founded by the Dutch West India Company on Manhattan Island. This formed the nucleus of New Amsterdam, whose name was changed to New York when it was taken by the English in 1664. Forest produce, hemp, and in the southern settlements tobacco, formed the principal articles of export trade among these

communities. Early in the seventeenth century, however, furs began to reach Europe from Hudson Bay, and in 1670 this trade became a monopoly of the English Hudson's Bay Company. Sugar, coffee, and cotton gradually came to be important products of the West Indies, but it was not till after the severance of the English colonies from the mother country in the American Revolution or War of Independence (1776–83) that cotton came to be extensively cultivated on the mainland. But the great commercial development of North America was that which followed the introduction of steamships and railways. By that means bulky produce of the far interior, such as grain and provisions, could for the first time be conveyed to Europe at a sufficiently low cost to allow of the growth of an immense trade in these commodities.

GREENLAND

Greenland is a large mass of land, a lofty plateau, almost wholly buried under ice except for parts of the coasts and the 'nunataks' which rise above the ice. The few settlements on the west coast, inhabited chiefly by Eskimo under Danish rule, are of little importance in commerce, except as being sometimes visited by whalers and as a source of cryolite. The development of aerial transport has directed attention to the possibility of developing a great circle route *via* Greenland, but the meteorological conditions (especially the violent winds) are against such proposals as several recent expeditions have found.

THE DOMINION OF CANADA [1]

Canada is situated to the north of the United States, from which it is separated partly by the middle line of Lakes Superior, Huron, Erie, and Ontario, partly (west of the Lake of the Woods) by the parallel of 49° N. The inhabitants are mainly of British origin and Protestant in religion; but French Roman Catholics make up about one-quarter of the population, chiefly in Quebec, where the first colonists were French. There are about 130,000 Indians, most of whom are hunters, roaming over the forest regions of the north-west, and living by the sale of furs to the fur-trading companies. The islands of the Arctic Archipelago are of interest in the history of commerce, from the fact that a north-west passage to eastern Asia was for centuries sought in vain among the channels that separate them. A passage was at last effected by Maclure in 1850–53, but the route is too much encumbered by ice to be of any use commercially.

The Dominion, formed in 1867, by the union of separate colonies, has a general government and parliament for the common affairs,

[1] I am greatly indebted to Mr. P. M. Dearle, of the office of the High Commissioner for Canada, London, for help in revising this section.

but it has nine provinces (some of which correspond with old colonies) with separate parliaments, empowered to deal with matters of local concern. These provinces are Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. In addition to these there is a vast territory to the north-west of Hudson Bay, not yet so organised. The Yukon territory was separated in 1898 and the three Prairie Provinces as well as Ontario and Quebec have been enlarged at the expense of the North-West Territories which, since 1920, have been divided into the three provisional districts of Franklin, Keewatin, and Mackenzie. The seat of the general government is Ottawa, in the province of Ontario.

The **extent** of the Dominion territory is upwards of three millions of square miles, but the more populous portions of this vast area are confined to the region south of the St. Lawrence west of the city of Quebec, the land on the north adjacent to that river and to the Great Lakes from Quebec to the eastern shores of Lake Huron, the southern parts of the three Prairie Provinces and the south-west of British Columbia. The whole of the more populous area lies at least two degrees farther south than the southernmost point of England.

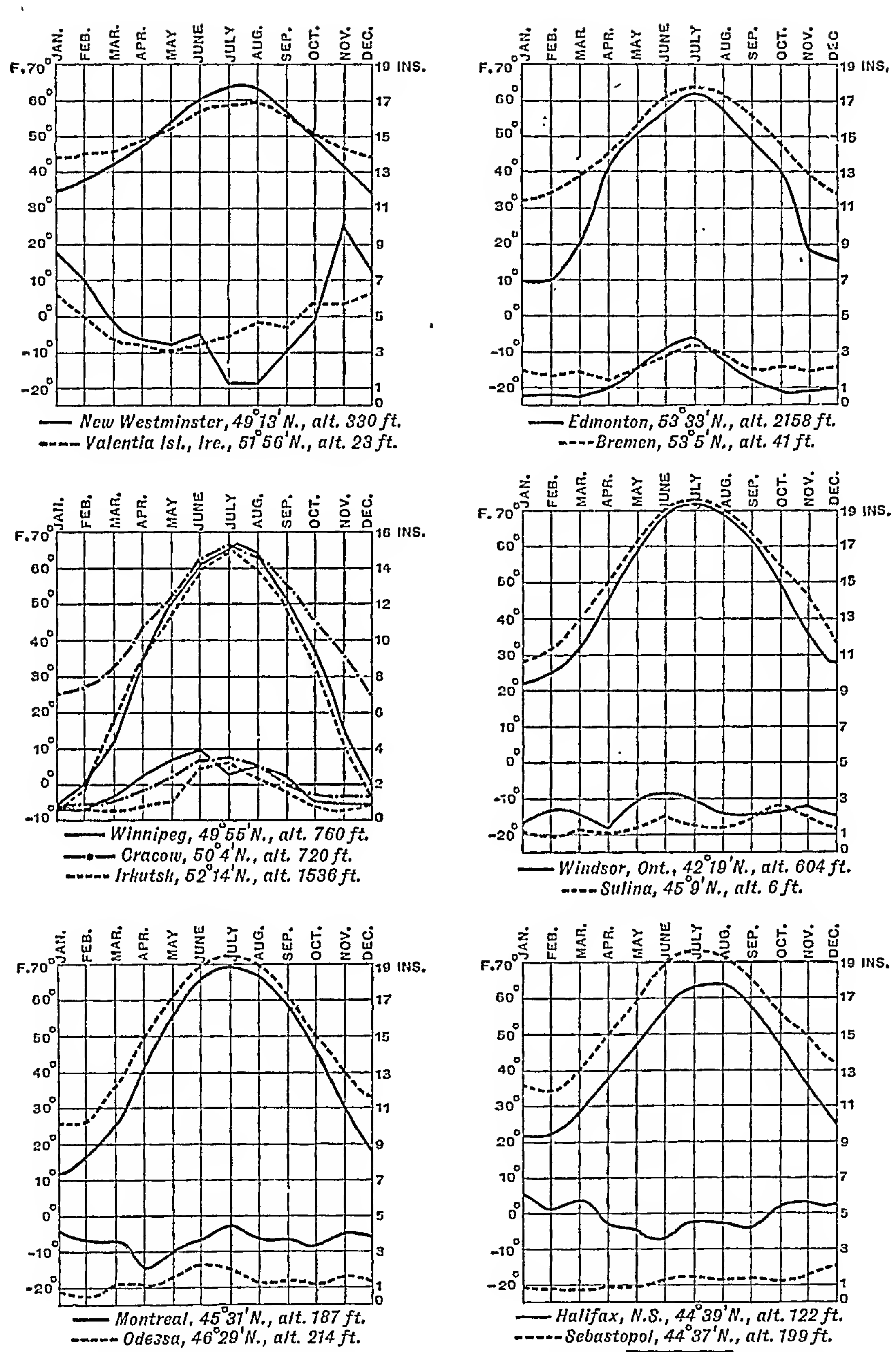
The **surface** east of the Rocky Mountains is made up principally of plains and undulating lowlands. Tundras, similar to those of northern Russia and Siberia, cover large tracts in the north, descending in the east to about 58° N. on the western shore of Hudson Bay, and still farther east extending along the whole coast of Labrador. There next follows a range of vast forests, chiefly of pines and firs, a region that embraces the whole of the Dominion east of Lake Winnipeg, except the tundra area and the limited agricultural area in the south. In the west of the Dominion, this region is succeeded to the south by the prairies, which extend farthest north on the gently sloping tablelands immediately to the east of the Rocky Mountains. The nearly treeless prairies here extend about 3½ degrees north of the United States' frontier, and the area with less than 20 per cent. of forest land reaches about 10 degrees north of that frontier, between the Rocky Mountains and Lake Athabasca. In the development of the Canadian Dominion in the last fifty years this prairie region has been of the highest importance, for it contains vast areas now under the plough, with soil of the richest description, and a climate admirably adapted for agriculture, though very different from that of England. In this prairie region there is a rise on the whole from east to west, and this rise takes place in such a manner as to form what are known as the three prairie steps. The lowest level in this region is that of the Red River valley, between 700 and 800 feet. West of that valley the surface rises to about 1,500 feet, and this terrace stretches west-

wards for about 250 miles. The ground then rises to about 2,000 feet, and then the rise is more gradual to the foot-hills of the Rocky Mountains.

In the eastern half of the Dominion, the **geological structure** is of peculiar geographical importance. It is of such a nature as must for ever forbid extensive agricultural settlement. From the banks of the St. Lawrence, some little distance below Quebec to the Red River valley and north-westwards to the Mackenzie River, there extends an enormous region of ancient crystalline rocks—the Laurentian or Canadian Shield—protruding in many places in naked masses, in other places having only a thin covering of soil supporting forests of fir and pine. The principal exception to this character is the area already referred to as the most populous of the Dominion, but there are also many larger or smaller isolated valleys with a deep and fertile soil.

The general similarity between the climate of North America and that of corresponding latitudes in Europe and Asia is noticed on p. 45, but some details are of importance (see the accompanying diagrams). East of the Rocky Mountains the climate of the Dominion generally is characterised by those extremes of temperature which prevail in the same latitudes in the northern hemisphere everywhere, except in regions exposed to south-westerly winds from the ocean. But an important difference between western Canada and Europe is due to the fact that the whole area between the Rocky Mountains and the Pacific coast is mountainous, and that the mountains run throughout parallel to the coast and nearly at right angles to the prevailing winds. Hence great contrasts, in respect of both rainfall and temperature, begin within a short distance of the Pacific. At New Westminster, at the mouth of the Fraser, the mean temperature of the coldest month of the year is 36° F., of the hottest about 58° F., and the total precipitation[1] 65 inches; at Lillooet, higher up the Fraser valley but behind the Coast range, the corresponding figures for temperature are 22° F. and 68° F., for rain- and snow-fall about 13 inches. To the east of the Rocky Mountains the total precipitation is scanty, though it begins to increase again in eastern Saskatchewan. But as affecting the cultivation of grains, two considerations must be borne in mind. First, it is important that the great bulk of the total precipitation takes place during the summer, especially the early summer, months. (See p. 41.) Second, throughout the Dominion of Canada a considerable proportion of the precipitation takes place in the form of snow, the amount of which, however, is much greater in the east than in the west. At Montreal the average of the thirty years

[1] Including both rain and snow. The meteorological office of Canada reckons ten inches of snow as equal to one inch of rain (of course, only a very rough average).



COMPARISON OF METEOROLOGICAL DATA, CANADA, EUROPE AND SIBERIA. Mean temperature curves above, rainfall below.

Degrees F. numbered on left, inches of rainfall on right.
Canadian curves continuous, European or Asiatic dotted or broken lines.

previous to 1914 was over 120 inches; at Toronto, the average of the same period, 58 inches; and even in 42° N., in the extreme south of Ontario, the same latitude as the northern frontier of Portugal, in a district in which grapes are grown for wine-making in summer, the average of fourteen years was 57 inches. At Winnipeg, in Manitoba, the average of thirty years (1885–1914) was only 49 inches. Two advantages for wheat-growing accrue from this snowfall, one experienced principally in the eastern half of the Dominion, the other in the west. In the east the total precipitation is ample, and is fairly equally distributed throughout the year, and there the great advantage of the snow as regards wheat-culture is that it protects the ground against the severe frosts. There, accordingly, winter wheat (or, as it is called in America, fall wheat) can be regularly grown, whereas in all the Prairie Provinces the frost comes before the snow, and hence only spring wheat can be cultivated. But in this part of Canada it is important that the melting in spring of water frozen underground furnishes moisture just when it is wanted. In the more arid parts of the prairies, however, irrigation is necessary—in the southern parts of Saskatchewan and Alberta. In these provinces the work is under the supervision of the Dominion Government, although the actual irrigation plants are being constructed and operated by private companies. The Canadian Pacific Railway Company has constructed and operated in the Province of Alberta three large projects known as the Eastern, Western, and Lethbridge sections. The total irrigable area in these sections amounts to 838,000 acres, of which more than a tenth is actually irrigated, with about 4,200 miles of canals and ditches. The water is obtained from the Bow River and the St. Mary River. Other large irrigation schemes in Alberta include the Canada Land and Irrigation Co.'s area (using the Bow River) and the Lethbridge Northern area (using the Oldman River). There are four other important schemes in Alberta as well as about 800 small schemes in Saskatchewan and Alberta.

In those parts in which wheat is most largely grown, it is not the total amount of the annual rainfall that determines the amount of the produce. Between 1883 and 1901, the average precipitation in Manitoba varied from 12 to 22½ inches and the average yield of wheat per acre between 9 and 28 bushels, but there was no marked correspondence between the rainfall and the yield. Data are not yet available for a period long enough to establish any relation between the wheat-yield and the seasonal distribution of the rainfall, but the experience of farmers and such data as exist point to the peculiar importance of the rains of May and June for the prairies. (See the rainfall diagram for Winnipeg, p. 704.) The chief disadvantage of the Canadian climate for wheat-growing, and especially in the north-west, is the liability to the occurrence of frost before

harvest, but this risk is being greatly reduced by the careful selection of seed and the cultivation of hardy varieties of wheat, which ripen quickly, and, as it happens, yield hard wheats of exceptionally high value. The correspondence between the temperatures of Canada and those of Asia is indicated on p. 704, but it must be remembered that the summers that follow the cold but dry, invigorating, healthy, and pleasant winters are remarkably bright as well as warm. The whole of Canada, with the exception of near the coast in British Columbia, is favoured with more sunshine than any portion of Great Britain, Germany, Holland, or northern France. In winter the temperature in districts adjacent to the great mountain ranges is greatly mitigated by warm, dry, or moist winds, from the south-east, south or south-west, west of the Rocky Mountains, and from the south-west, west or north-west to the east of the Rocky Mountains, those in the latter case being such as are experienced in all parts of the world on the lee-side of mountains exposed on the weather-side to copious rains. In Canada they are known as chinook winds. In southern Alberta they cause the cold of winter to alternate with spells of bright warm weather, in which the ground is swept bare of snow and the pasture grasses are revived, and they thus make the rearing of live-stock the characteristic industry of this part of the prairies.

With regard to the **internal communications** of the Dominion, it is noteworthy, in the first place, that the St. Lawrence River and the Great Lakes, supplemented by a number of short canals (the longest is about 27 miles), form a system of internal navigation for sea-going vessels unparalleled in any other continent. The first of these canals to be constructed was the Lachine Canal immediately above Montreal, opened in 1824, and other canals between Montreal and Lake Ontario were completed by 1843. The Welland Canal, which runs parallel to the Niagara River and avoids the Falls of Niagara between Lakes Erie and Ontario, and is the longest, was constructed in 1824–29. It has 26 locks with a total rise of $326\frac{3}{4}$ feet. Its reconstruction on a large scale as the Welland Ship Canal was begun in 1913 at an estimated cost of £1,000,000. The difference of 325 feet in the level of the two lakes was overcome by seven locks 800 feet by 80 feet. It was opened in 1931 and more than £26,000,000 have been spent on its construction. Vessels of 15,000 tons are able to go from Lake Superior to Montreal. The shortest, but perhaps the most important of the Canadian canals is the Sault Ste. Marie (' Soo ') Canal between Lakes Superior and Huron, which was constructed between 1889 and 1895. It is little more than a mile in length, and has only one lock. Since 1855 there has been a canal on the United States side at the same place. The traffic through these canals is now the greatest canal traffic in the world—much greater than that through the Suez Canal. In 1855 the regis-

tered tonnage that passed through the United States Canal was little more than 100,000 tons ; in 1875, above 1,000,000 tons ; in 1890. above 9,000,000 tons. The actual freight carried in 1913 was 42·7 million tons, of which close upon five millions passed through the Canadian lock. In 1934 over 18 million tons of freight passed through Canadian canals.

By this series of waterways, small sea-going ships may be carried up a distance of 2,250 miles from the straits of Belle Isle, in the north of Newfoundland, to Fort William on Lake Superior, and within about 1,908 miles by rail from Vancouver, the seaport at the Pacific terminus of that railway. On the United States side they are carried up a distance of 2,400 miles to Duluth, at the very head of Lake Superior, which is now within 1,890 miles by rail of the nearest Pacific port. In practice, however, there is little traffic actually between the ocean and the Great Lakes, mainly owing to the difficulties of navigation between Montreal and Lake Ontario. An important project for shortening this route by the construction of what was to have been called the Ottawa and Georgian Bay Canal, a water-way running on the whole nearly due west from Montreal, by deepening the Ottawa, connecting it with Lake Nipissing and this lake with Lake Huron, was long considered. The alternative scheme, the canalisation of the St. Lawrence itself and a joint project between the United States and Canada rather than an all Canadian project, gradually gained favour but has failed to come to fruition. Apart from the enormous cost, it is difficult to gauge the injury which might be done to existing ports by converting the ports of the Great Lakes into direct ocean harbours.

The St. Lawrence navigation is usually open from about the end of April to near the end of November, or even the first week in December. The route from the mouth of the St. Lawrence, round the north of Newfoundland (by the straits of Belle Isle), is closed for a longer period than that by Cabot Strait, round the south of Newfoundland, which adds about 160 miles to the distance to Liverpool. With a view to extend the Great Lakes navigation, so as to develop a bigger export of grain through Dominion channels, ice-breakers are available where they are required—Port Arthur, Fort William, the Sault Ste. Marie Canal, and elsewhere. All the lights on Lake Superior, Lake Huron, Georgian Bay, Lake Erie, and Lake Ontario are kept in operation until the end of December, or later, if possible.

Besides the leading highway for ships, the Canadian Dominion possesses other less important inland waterways. The river Ottawa is continuously navigable, with the aid of a few canals, as far as the city of Ottawa ; and from thence there is a navigable connection by the Rideau River and Canal with Kingston on Lake Ontario. The Trent Valley Canal, opened in 1918, provides a waterway, for the

most part natural, $7\frac{1}{2}$ feet deep, between the Bay of Quinte, Lake Ontario, and the south end of Georgian Bay.

Above Lake Superior, navigation can be continued with canoes and motor-boats by Rainy Lake and River, Winnipeg Lake and River, and the North Saskatchewan River to near the base of the Rocky Mountains. The Assiniboine and Red River, which both belong, like the Saskatchewan, to the basin of Lake Winnipeg, are likewise navigable, but the Nelson, the outlet of Lake Winnipeg to Hudson Bay, is too much obstructed by rapids to be of great service as a waterway.

In the more populous parts of the Dominion there is a tolerably complete network of railways, and since November 1885, when the Canadian Pacific Railway was completed, there has been uninterrupted railway communication from ocean to ocean within Dominion territory. The above tables exhibit some of the more important elements in the comparison of this railway, as a trans-continental means of communication, with the chief trans-continental routes of the United States. It will be observed from Table I that the Canadian Pacific has an advantage over both its older rivals, the Northern Pacific and the Union and Central Pacific, in the lower height of its passes, and the shorter length of route at high levels. The Great Northern Railway, the main line of which was completed in 1893, has, however, as favourable a route on the whole as that of the Canadian Pacific. The Canadian Northern Railway, which was begun in 1896, is now part of the Canadian National system. It extends from ocean to ocean, and is now operating trains between Quebec and Montreal in the east and Winnipeg, Edmonton, and Vancouver in the west. It began in the west, running from Port Arthur south to the Lake of the Woods. Its development was rapid. In the north-east it runs from Quebec *via* Montreal and through Ontario to Port Arthur. With much government assistance this railway for many years, like the Canadian Pacific Railway, extended its ramification over the prairie provinces. It reached Edmonton in 1909, and by 1915 was completed through the Yellowhead Pass to Vancouver. The company, however, got into financial difficulties, and, like the Grand Trunk Railway, passed under government ownership and operation.

On the eastern side of the Rocky Mountains the ascent of the main line of the Canadian Pacific Railway to the summit was always comparatively easy. A gradient exceeding 1 in 100 occurred over only about half a mile. But soon after passing the summit on the west side a very rapid descent took place. There was a drop of 1,150 feet in seven and a half miles, involving gradients rising at one place to 1 in 22, so that the speed in descending had to be reduced to an average of less than ten miles an hour—at one place only five miles an hour. This dangerous piece of railway was successfully

TABLE I

Railways across Rocky Mountains and Pacific Coast Ranges

Railway.	Height in feet of Summits.	Maximum Gradient expressed as percentage of Rise for a Given Length.		Date of Completion.
		Westbound.	Eastbound.	
Canadian Pacific	5,344	1·2	2·2	1885
Canadian National (Grand Trunk Pacific)	3,712	0·5	0·4	1914
Canadian National (Canadian Northern)	3,700	0·5	0·4	1915
Great Northern	5,202	2·2	2·2	1897
Northern Pacific	5,569	2·2	2·2	1883
Chicago, Milwaukee, and Puget Sound	6,350	0·3	0·3	1909
Union and Central Pacific	8,247	2·0	2·2	1869
Union Pacific and Oregon	8,247	2·2	2·0	1884
Santa Fé	7,510	3·5	3·3	1883
Denver and Rio Grande	10,239	1·4	2·3	1871
Western Pacific	5,712	1·0	1·0	1909
Southern Pacific	4,610	2·0	2·0	1883
San Pedro, Los Angeles, and Salt Lake	6,060	1·6	3·0	1905

TABLE II

Railway.	From	Length in Statute Miles.	Length in Nautical Miles from respective Pacific or Atlantic Ports to			Total Ocean Route Liverpool to Hong Kong.
			Yokohama.	Hong Kong.	Liverpool.	
C.P.R.	Vancouver[1]	To Port Arthur 1,915 ,, Montreal 2,908	4,330	5,890	2,800	8,690
	Vancouver by all Canadian route	,, Halifax 3,742	,,	,,	2,480	8,370
	Vancouver, by Short Line (through Maine, U.S.). (Opened 1889.)	,, ,, 3,595	,,	,,	,,	,,
	Vancouver, by shortest connections	,, New York 3,162	,,	,,	3,030	8,920
N.P.R.	Seattle, by shortest connections	,, Duluth 1,915 ,, New York 3,251	4,330	5,890	3,030	,,
	Portland, Oregon, by shortest connections	,, Duluth 1,890 ,, New York 3,235	4,250	5,810	3,030	8,840
U. & C.P.	San Francisco, by shortest connections	,, Chicago 2,356 ,, New York 3,270	4,510	6,070	3,030	9,100

[1] Under an agreement between the Imperial Government and the Government of the Canadian Dominion, a permanent line of first-class steamships (Canadian Pacific Steamships), suitable for service as armed cruisers, plies between Vancouver and Hong Kong by Yokohama. The first mails by this route were delivered in London on May 13, 1891—25 days after leaving Yokohama, 32 days after leaving Shanghai, notwithstanding a delay of three days at New York. The normal crossing of the Pacific from Yokohama to Vancouver takes 10 days.

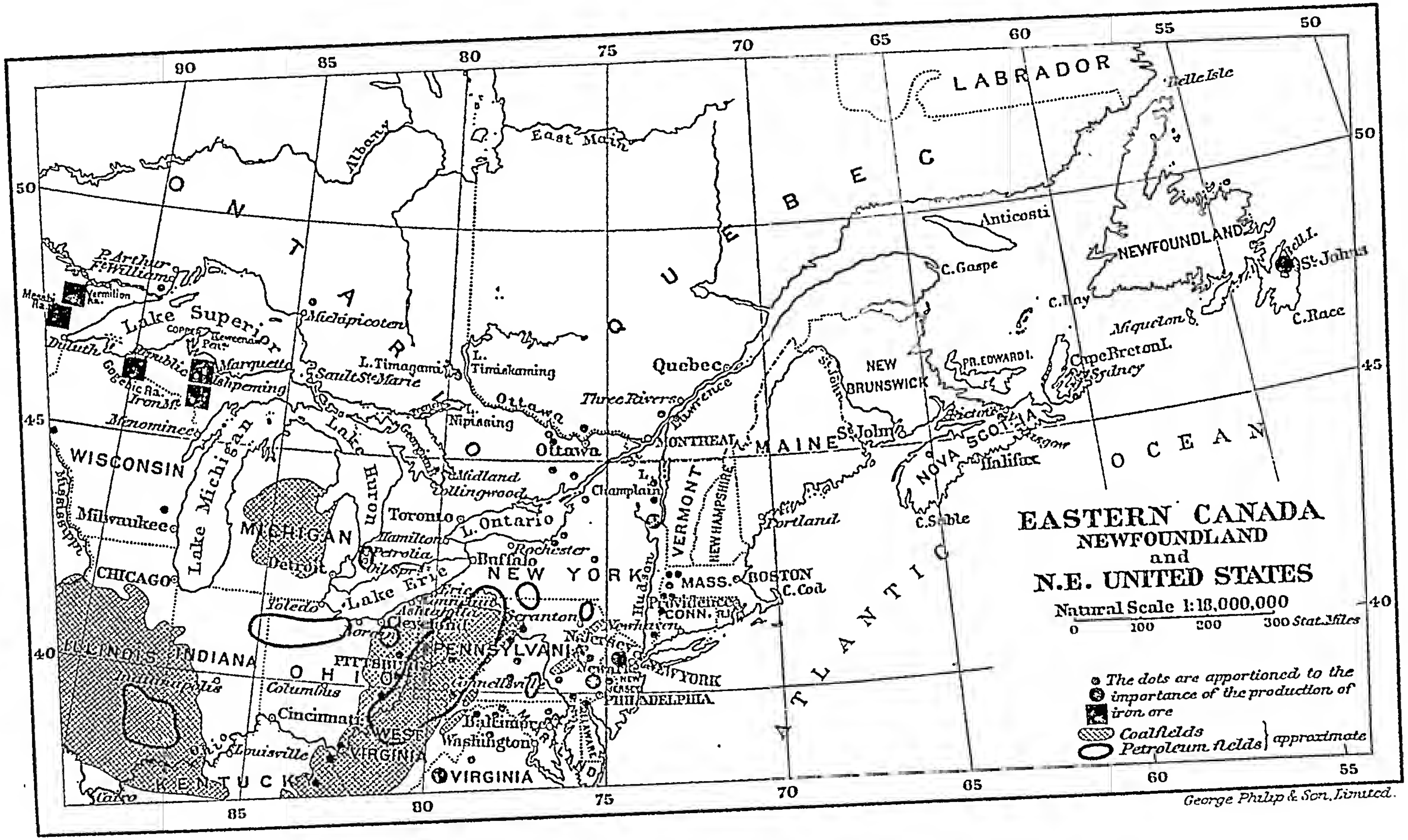
operated for twenty-four years without an accident to a passenger train, but the increasing traffic, involving heavier trains, at last rendered the reduction of the gradient a necessity. This was effected in 1909 by making the line double on itself and by piercing two spiral tunnels through mountains on opposite sides of the Kicking Horse River. Further west, where in crossing the Selkirks the line had to be protected against repeated avalanches by snow-sheds costly to maintain, a tunnel through that range five miles long was opened in December 1916. Further south another line of the same railway crosses the Rocky Mountains in the Crow's Nest Pass at an altitude of 4,453 feet.

All the railways of Canada, like most of those of North America generally, are on the same gauge as our own—4 feet 8½ inches. The majority of the railways were in the hands of private companies, but the government now owns a large mileage of important railway lines. By amalgamations most of the private railways were brought under the control of two great companies, the Grand Trunk Railway, the older of the two, and the Canadian Pacific. The most important line of the Grand Trunk system was that connecting Montreal on the one side with the south-west of the peninsula between Lakes Huron and Erie (the Lake Peninsula of Ontario), there communicating with the shortest line in the United States to Chicago, the great lake-port at the head of Lake Michigan, and on the other side, after crossing the St. Lawrence by a bridge nearly two miles in length (including approaches), proceeds to the United States seaport of Portland (Maine). In 1903 the Dominion government entered into a contract with the Grand Trunk Railway Company for the construction of a new trans-continental railway from Prince Rupert, on the Pacific Coast, to Moncton, in New Brunswick. The eastern direction of this line from Moncton to Winnipeg was constructed by the government, and crosses the St. Lawrence near Quebec by a cantilever bridge, the main span of which was at the time the longest in the world, being nearly 1,800 feet from the centre to centre of piers, or 100 feet longer than that of the Forth Bridge in Scotland. In 1906 Canada had 1,713 miles of government, against 20,454 miles of private railways, inclusive of electric street railways. In 1934 the mileage was 42,270, of which the government owns well over half. The Canadian Pacific (16,597 miles) is the only important privately owned railway. The government is now responsible for the systems formerly owned by the Canadian Northern, Grand Trunk, and Grand Trunk Pacific Railways. The whole group is now known as the Canadian National Railways. Some of the provincial governments have also railway interests.

The construction of a railway direct from the grain-growing areas of Manitoba to Churchill, on Hudson Bay at the mouth of the Churchill River, was begun in 1911. Until 1927 it was in-

tended to make Port Nelson the terminus on Hudson Bay, but the silting of the inlet there rendered the port site unsuitable. By 1929 the track was laid to Churchill, and in the autumn of 1931 the first shipment of grain to the United Kingdom by this route was made. The importance of this railway arises from the fact that it forms the shortest route for the products of the Canadian Prairies to England, but its value depends in a great measure on the navigability of Hudson Bay and Hudson Strait. The difficulties of navigation are almost confined to the strait, which is 500 miles in length, and for the greater part of the year is obstructed by ice. The strait is open, however, for at least two or three months every year, and in some years, at least for steamers of suitable build, considerably longer. The ocean length of this route from Liverpool is 2,936 nautical miles to Churchill. A hindrance to the extensive use of the route is the high cost of insurance on the vessels against the risks of ice.

The minerals of most importance commercially at present are gold, coal (in the two forms of lignite and bituminous coal), nickel, copper, lead, zinc, and silver, together with platinum, arsenic, cobalt, selenium, tellurium, cadmium, bismuth, radium, and many non-metallic minerals. The coal-fields are enormous in extent, though as yet worked only where there are special facilities for commerce, as in the neighbourhood of seaports (in the north of Nova Scotia, and in Vancouver Island, British Columbia), and at various points on or near the routes of the Canadian railways, where it is very abundant. Extensive as the coal-fields are, however, it is important to note that, apart from the northern Ontario lignite deposits, there is no coal between the small deposits of New Brunswick and those of southern Saskatchewan, that is, in all the most populous areas of the Dominion. It is this that makes Canada so largely dependent on the United States, not only for anthracite, which is a fuel ordinarily used for domestic purposes in central heating, but also for bituminous coal. The province of Alberta is underlaid to the extent of about 17,000 square miles with bituminous and semi-bituminous coal of varying quality and anthracite is known in western Alberta. Four-fifths of Canada's total reserves of 1,300,000 million tons are in Alberta (coal and anthracite). In British Columbia a coal-field producing coal of excellent quality, immediately to the west of the Crow's Nest Pass, began to be worked as soon as the branch of the Canadian Pacific Railway through that pass was opened. The amount of coal in this neighbourhood is very considerable. The total production of coal is almost 15 million tons annually and a like quantity is imported from the United States, Britain, Germany, Russia, French Indo-China, and other countries. Iron ore is met with in many places, but so far no important deposits have been developed in Canada. The


EASTERN CANADA
NEWFOUNDLAND
and
N.E. UNITED STATES
Natural Scale 1:18,000,000
0 100 200 300 Stat. Miles
The dots are apportioned to the importance of the production of iron ore
Coalfields
Petroleum fields
approximate
LABRADOR
QUEBEC
ONTARIO
NEWFOUNDLAND
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VERMONT
NEW HAMPSHIRE
MASS.
CONN.
NEW YORK
PENNSYLVANIA
OHIO
INDIANA
ILLINOIS
KENTUCKY
WEST VIRGINIA
VIRGINIA
WISCONSIN
MICHIGAN
ATLANTIC OCEAN
Anticosti
C. Gaspe
C. Ray
C. Race
St. Johns
Belle Isle
Miquelon
Cape Breton I.
Sydney
PR. EDWARD I.
Halifax
C. Sable
St. John
Quebec
Three Rivers
MONTREAL
Ottawa
Nipissing
L. Timiskaming
L. Timagami
East Main
Albany
Lake Superior
Lake Michigan
Huron
L. Ontario
Lake Erie
L. Champlain
Hudson
Toronto
Hamilton
Petrolia
Buffalo
Rochester
Midland
Collingwood
Sault Ste Marie
Michipicoten
Marquette
Ishpeming
Gogebic Ra.
Iron Mt.
Menominee
Duluth
P. Arthur
Ft. William
Vermilion Ra.
Mesabi Ra.
Milwaukee
CHICAGO
Detroit
Toledo
Lorain
Cleveland
Ashtabula
PITTSBURG
Scranton
Columbus
Cincinnati
Louisville
Indianapolis
Cairo
Mississippi
Baltimore
Washington
PHILADELPHIA
NEW YORK
NEW JERSEY
Providence
BOSTON
C. Cod
Portland
George Philip & Son, Limited.

Michipicoten deposits in western Ontario and the Moose Mountains deposit at Sellwood, 60 miles N. of Key Harbour at the north-east angle of Georgian Bay, have both proved disappointing, but the new Helen mine has recently been opened. North of Kingston, Ontario, magnetite occurs in deposits of variable size scattered over an area of 1,600 square miles, but so irregularly as not to have led as yet to large development. Near Three Rivers bog iron ores have long been smelted, though in small quantity, in charcoal furnaces. Iron ores are also worked to a small extent in the north of the mainland of Nova Scotia and on Texada Island in the Straits of Georgia, B.C. From 1921 to 1936, however, no iron ore was mined in Canada and the blast-furnaces depended entirely on imported ore. Pig-iron and steel production greatly increased after the War, but dropped again in 1922 and 1924, since when, however, it has again increased to a varying total but under a million tons. Gold is obtained in largest quantity from the old rock of the Canadian Shield at Porcupine and Kirkland Lake and numerous newer localities in Ontario and Quebec, and also in Manitoba, Saskatchewan, Nova Scotia, and in British Columbia and the Yukon. The production from the once famous alluvial deposits of the latter has dwindled to a very small figure. The silver production of Canada comes chiefly from the rich silver-cobalt ores of Northern Ontario and from mixed ores in British Columbia. The latter province has a large output of copper and lead and zinc. Ontario provides the bulk of the world's supply of nickel and cobalt, and also much copper, platinum, selenium, and tellurium. Quebec is one of the world's largest producers of asbestos and has a large output of other minerals. Canada has a rapidly expanding production of mineral oil and gas and hopes are held for a large extension of production in the Prairie Provinces and the north-west. A recent development is in non-metallic minerals, notably for cement, after the War. Aluminium is electrically reduced from imported bauxite.

The tables given below show the principal features of the external commerce of Canada, and the changes that have taken place therein since 1871–75. The great change shown in the relative position of wheat and timber in the export table, the rapid expansion of the wheat area in Canada in correspondence with the diminishing rate of expansion in the United States. The cheese export shows the importance of the dairying industry, especially in the eastern provinces but more recently in Manitoba; from which there is also a considerable export of butter, an export which has been greatly promoted by government encouragement. The enormous value of the export of wood-pulp (especially to the United States) should be noted—but especially the growth in the export of paper rather than of pulp—a testimony to the increase in manufacturing industry general throughout Canada. Among the imports iron and steel

goods now hold the first place, exceeding in value the textile group including the cotton and woollen manufactures. The tea and coffee consumed in the Dominion were both imported chiefly through the United States till after the opening of the Canadian Pacific Railway. From the United States Canada also gets small supplies of refined sugar, though sugar-refining is now being carried on more and more largely in the Dominion. British shipping still takes the lead in the sea-borne traffic of Canada, but no small portion is conveyed under the Canadian flag, notably the Canadian Pacific Steamship services on both Atlantic and Pacific and the Canadian National Steamships to the West Indies and British Guiana.

Since 1879 the foreign commerce of the Dominion has been greatly affected by the fluctuations in the customs tariff, with the view of developing local manufacturing industries and external trade. The more important **manufacturing industries** at first were naturally those which consist in subjecting the raw materials of the country to the simplest processes, preparatory to sending the products to a home or foreign market—flour-milling, saw-milling, the manufacture of wood-pulp, paper, and various articles made of wood, the making of boots and shoes, and other industries connected with leather—but in recent years there has also been a considerable development of rubber, cotton, and woollen manufactures and other industries depending on imported raw materials and in the manufacture of agricultural implements, automobiles, machinery, and a wide variety of factory products. An attempt was made to stimulate the iron industry of Canada by bounties as far back as 1883, but the most important act with this view was that of 1897, under which bounties were granted on every stage of the iron industry from the raising of the ore to the manufacture of the steel. Under this encouragement iron and steel works were established at Sydney, N.S., Hamilton, Sault Ste. Marie, Port Arthur, and elsewhere. The bounties ceased at the end of 1910 except for wire-rod (fencing wire entering Canada duty free) and pig-iron made by electrical processes. The development of hydro-electric power has had an enormous influence on the industrial progress. Manufacturing is now by far the leading group of industries in Canada.

A new feature was introduced into the external commerce of the Dominion of Canada by the adoption under an Act of 1897 of a preferential tariff in favour of British goods, which from August 1, 1898, were to be admitted on the payment of customs duties 25 per cent. less than those levied on foreign goods. A later tariff came into operation in 1907. Under it, the British preferential tariff applied to nearly all parts of the Empire except Australia and Newfoundland. A still lower rate of duty—a remission of 50 per cent. of the usual—was allowed to the British West Indies. An intermediate tariff was applied to the products of certain foreign

countries. Under the Ottawa Agreement of 1932 the principle of Empire preference was further developed and this agreement greatly extended by that of 1937 controls the present tariff. British Empire trade agreements are now in force with the United Kingdom, Irish Free State, South Africa, Australia, New Zealand, Newfoundland, and Southern Rhodesia. There are numerous commercial treaties with foreign countries, particularly the United States.

Three-quarters of all the foreign trade of Canada is with the United States and the United Kingdom. The exports go almost equally to the two countries, but the United States sends three times as many imports as the United Kingdom. The percentage value of the imports into Canada from the United Kingdom reached its maximum, 58·57 per cent., in 1871–72. After that year there was a decline till 1898–99, when the percentage was 24·05. Meanwhile the percentage of the United States had risen from 33·09 in 1871–72 to 60·96 per cent. in 1900–01. In that year, however, more than 50 per cent. of the value of the imports from the United States was duty free, as against only 26·3 per cent. from the United Kingdom. The duty-free articles from the United States included anthracite to the value of nearly eight million dollars, besides various kinds of lumber and timber, hides, maize, raw cotton, mining machinery, steel rails, crude rubber, and settlers' effects, each to the value of more than one million dollars, whereas the only duty-free goods imported from the United Kingdom to the value of as much as half a million dollars were hides, raw wool, jute cloth, and settlers' effects, none of these reaching the value of one million dollars. The principal textile manufactures of the United Kingdom even with the abatement granted by the tariff as it existed in 1907 were subject to duties varying from 15 to 25 per cent. *ad valorem*, and that on certain woollen and worsted goods of British origin amounted to as much as 30 per cent. *ad valorem*, as against 35 per cent. of other origin. In 1913–14 the percentage value of the imports from the United Kingdom was 21·35 as against 64·0 from the United States. Inevitably the War told adversely on British imports, which in 1917–18 sank to 8½ per cent. of the total, in the following year to less than 8 per cent. As throwing light on the steady gain of the United States on the United Kingdom in the Canadian market before the War it should be borne in mind that in the competition the United States has the following advantages among others to countervail the preference: (1) that transport from the United States can be effected without break of bulk; (2) that the ports at which British goods must be transferred from ocean ships to railways or some other means of carriage are at a great distance from the most populous parts of the Dominion (Montreal 335 miles from Toronto, 1,424 miles from Winnipeg); (3) that the large and highly protected market of the United States greatly favours the economies

CANADA[1]

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. 1871–75	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14	'25–30[5]	Percentages of Total Value. '71–75	'80–85	'85–90	'90–95	'95–00	'00–05	'05–11	'11–14	'25–30
1. Iron and steel and manfrs.	—	—	—	1·97	2·67	5·40	8·15	14·77	—	—	—	—	7·9	8·9	11·2	10·9	11·3	—
Do., earlier classification	3·88	2·58	2·68	2·45	—	—	—	—	—	15·2	10·7	11·5	9·8	—	—	—	—	—
4. Machinery & locomotives		*0·59*	*0·37*	0·45[2]	0·93	2·33	3·81	8·95	8·94		*2·4*	*1·6*	1·8	3·1	4·8	5·1	6·9	4·4
2. Coal and coke	0·60	1·70	1·68	2·04	2·10	3·65	5·94	9·56	12·25[6]	2·3	7·0	7·2	8·1	7·0	7·6	7·9	7·3	5·7
3. Woollens	*2·48*	*1·82*	*2·06*	*1·97*[2]	1·76	1·60	3·97	5·43	10·21	*9·7*	*7·5*	*8·9*	*7·9*	5·9	5·4	5·3	4·2	4·7
5. Cottons	2·19	1·77	0·96	0·86	1·08	1·64	3·07	5·22	7·05	8·6	7·3	4·1	3·4	3·6	3·4	4·1	4·0	3·1
6. Wood and manufactures	—	—	0·53	0·54	0·76	1·47	2·41	4·80	4·90	—	—	2·3	2·2	2·5	3·1	3·2	3·7	2·2
7. Sugar	1·03	1·08	1·09	1·49	1·29	1·68	2·33	3·29	7·57	4·0	4·4	4·7	5·9	4·3	3·5	3·1	2·5	3·6
8. Drugs, chemicals, dyes	—	—	—	0·59	0·73	1·17	1·96	3·00	6·81	—	—	—	2·4	2·4	2·4	2·6	2·3	3·1
9. Fruit	—	—	0·41	0·53	0·60	0·92	1·75	3·09	4·81	—	—	1·8	2·1	2·0	1·9	2·3	2·4	2·1
10. Raw Cotton	0·09	0·49	0·69	0·72	0·75	1·22	1·75	1·81	5·16	0·4	2·0	3·0	2·9	2·5	2·5	2·3	1·4	2·4
11. Silk and manufactures	0·49	0·45	0·54	0·52	0·62	0·97	1·42	2·15	5·66	1·9	1·9	2·3	2·1	2 1	2·0	1·9	1·6	2·6
12. Maize	—	—	—	—	1·20	1·02	1·41	1·62	3·61[7]	—	—	—	—	4 0	2·1	1·9	1·2	1·6
13. Wheat	1·37	1·00	0·59	0·70	0·93	0·95	1·20	1·33		5·4	4·1	2·5	2·8	3·1	2·0	1·6	1·0	
18. Tea	0·88	0·73	0·69	0·65	0·68	0·74	0·98	1·38	2·46	3·4	3·0	3·0	2·6	2·3	1·5	1·3	1·1	1·2
Average total value	25·56	24·26	23·23	25·10	30·00	48·09	75·03	130·33	221·46									

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	1871–75	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14	'25–30[5]	'71–75	'80–85	'85–90	'90–95	'95–00	'00–05	'05–11	'11–14	'25–30
1. Wheat	1·24	1·58	0·97	1·78	2·86	4·11	9·72	19·81	68·25	7·0	7·5	5·2	7·7	9·0	9·5	17·0	23·9	26·5
2. Timber	*4·69*	*4·50*	4·24[3]	4·72	5·36	5·98	7·42	6·86	21·29[8]	*26·5*	*22·6*	22·9	20·4	16·9	13·8	13·0	13·0	8·4[8]
3. Cheese	0·60	1·49	1·83	2·82	3·53	4·53	4·73	4·16	5·12	3·4	7·5	9·9	12·2	11·1	10·5	8·3	5·1	2·0
4. Animals	0·50	1·68	1·98	2·12	2·35	2·71	2·61	1·24	3·83	2·8	8·5	10·7	9·2	7·4	6·3	4·5	1·5	1·5
Cattle	*0·16*	*1·00*	*1·24*	*1·56*	*1·67*	*2·18*	*2·22*	*0·98*	—	*0·9*	*5·0*	*6·7*	*6·7*	*5·3*	*5·0*	*3·9*	*1·2*	—
5. Silver and ore	—	—	0·03	0·06	0·48	0·42	2·37	3·91	2·54	—	—	0·2	0·3	1·5	1·0	4·1	4·8	1·0
6. Bacon and hams	0·30	0·18	0·14	0·44	1·70	2·70	2·03	1·21	3·35	1·7	0·9	0·7	1·9	5·4	6·3	3·5	1·5	1·3
7. Wheat flour	0·54	0·43	0·30	0·33	0·58	1·02	1·98	3·88	13·17	3·0	2·1	1·6	1·4	1·8	2·4	3·5	4·8	5·2
8. Gold ore, dust, &c.	0·26	0·19	0·18	0·08	1·02	3·89	1·72	2·18	3·69	1·5	0·9	1·0	0·4	3·2	9·0	3·0	2·7	1·5
9. Fish, fresh, salt, &c.	—	—	0·99	1·16	1·03	1·22	1·63	1·87	7·35	—	—	5·3	5·0	3·2	2·8	2·8	2·3	2·9
10. Copper ore	0·03	0·04	0·04	0·06	0·17	0·74	1·36	1·74	4·37	0·2	0·2	0·2	0·3	0·5	1·7	2·4	2·1	1·7
11. Canned lobster and salmon	—	—	0·46	0·72	1·04	1·08	1·27	1·58	—	—	—	2·5	3·1	3·3	2·5	2·2	1·9	—
12. Coal and coke	0·21	0·48	0·43	0·71	0·78	1·05	1·11	1·00	0·99	1·2	2·4	2·3	3·1	2·5	2·4	1·9	1·2	0·4
14. Wood blocks for pulp	—	—	—	0·07	0·16	0·36	0·92	1·36	—	—	—	—	0·3	0·5	0·8	1·6	1·7	—
15. Wood pulp	—	—	—	0·09	0·24	0·53	0·92	1·16	9·67	—	—	—	0·4	0·7	1·2	1·6	1·4	4·0
20. Butter	0·59	0·48	0·15	0·21	0·63	1·10	0·56	0·19	1·45[9]	3·3	2·4	0·8	0·9	2·0	2·5	1·0	0·2	0·6[9]
27. Barley and rye	0·73	1·53	1·19	0·42	0·18	0·22	0·28	0·84	—	4·1	7·7	6·4	1·8	0·6	0·5	0·5	1·0	—
Average total value	17·69	19·96	18·53	23·10	31·80[4]	43·20	57·27	81·37	255·17									

[1] Year ended June 30 down to 1906, thereafter March 31. [2] For 1890–95, according to earlier classification, machinery, &c., £424,000; woollens, £1,930,000.
[3] Timber, 1885–90, according to earlier classification, £4,000,000.
[4] The figures for the periods ending with 1899–1900 include an estimated amount short in the exports to the United States (in 1899–1900, £1,120,000).
[5] Figures for 1925–30 are *imports* for home consumption and *exports* of home produce do *not* include bullion. The years are the fiscal [illegible]
April 1. An approximate rate of exchange of \$4·8 = £1 for this period has been tak
[6] Coal. [7] Cereals an

of large-scale production; and (4) the similarity of tastes and needs of the two countries is favourable to mutual commercial intercourse. In 1929–30 15 per cent. of the imports came from the United Kingdom, 68 per cent. from the United States. Of the exports 35 per cent. went to the United Kingdom, 46 per cent. to the United

CANADA

COUNTRIES OF ORIGIN[1] AND DESTINATION[2]

From	Percentages of Total Value.								
	1871–75	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14	1925–30
1. United States	39·1	41·3	45·5	47·8	58·4	60·3	60·3	65·1	66·3
2. United Kingdom	52·9	42·9	39·7	31·4	25·7	21·2	21·7	20·9	16·6
3. France	1·7	1·8	2·1	2·2	2·6	2·8	2·7	2·2	2·2
4. Germany	0·8	1·5	3·1	4·2	4·9	4·0	2·2	2·1	1·4
5. British W. Indies	0·8	1·8	1·0	1·1	0·7	1·2	1·8	0·9	1·2
6. British E. Indies	—	—	—	0·2	0·5	1·0	1·0	1·0	1·0
7. South America	0·3	1·0	0·9	0·4	0·6	0·5	0·8	1·0	0·7[3]
8. Belgium	0·2	0·4	0·6	0·5	1·3	1·2	0·8	0·7	0·9
9. British Guiana	—	0·2	0·2	0·2	0·1	0·5	0·8	0·7	—
10. Switzerland	0·1	0·2	0·2	0·2	0·3	0·5	0·7	0·7	—
11. Japan	0·8	0·8	1·3	1·3	1·2	0·7	0·6	0·5	1·0
18. China			0·9	0·9	0·6	0·3	0·2	0·1	0·3
12. Newfoundland	1·2	0·6	0·4	0·7	0·4	0·4	0·5	0·3	—
Average total value	25·09	22·43	21·80	23·44	28·25	46·50	73·00	127·22	221·46

To	Percentages of Total Value.								
	1871–75	'80–85	'85–90	'90–95	'95–00	1900–05	'05–11	'11–14	'25–30
United Kingdom	48·2	48·4	47·2	54·9	59·0	54·6	49·5	46·5	33·6
United States	43·1	42·7	44·5	35·8	32·7	34·8	38·5	41·2	39·0
Australia	0·1	0·4	0·5	0·4	0·9	1·4	1·1	1·1	1·3
New Zealand							0·3	0·4	—
South America	1·3	1·1	1·4	0·9	0·7	0·8	1·4	1·0	1·2[3]
Newfoundland	2·4	1·9	1·7	1·9	1·2	1·3	1·3	1·2	—
British W. Indies	2·4	1·8	1·6	1·6	1·0	1·1	1·0	1·1	1·4
Belgium	0·1	0·2	0·1	0·3	0·4	1·0	1·0	1·1	1·8
France	0·2	0·6	0·4	0·3	0·7	0·7	0·9	0·7	1·1
Germany	0·1	0·2	0·3	0·9	1·0	0·9	0·7	1·0	2·7
Cuba and Porto Rico	1·5	1·0	1·1	1·2	0·7	0·6	0·7	0·6	0·6

[1] Special imports. [2] General exports *except* for 1925–30, when special trade is represented.
[3] Argentine, 1927–30.

States. Canada has now become the fourth country in world export trade, fifth in total trade, and fifth in value of manufactures produced.

Provinces and Towns.—(1) **Nova Scotia** is a province including both the peninsula of that name and the island of Cape Breton to the north; in all it is about two-thirds of the size of Scotland. The fertile land, less than half the entire area, is mainly situated towards the west. The valleys of Annapolis and Gaspereau on the west

side parallel to the coast are the most favoured districts in respect of soil and climate, and above all noted for their apple orchards. The fisheries of this province furnish a large proportion of the Canadian output of cod and lobsters. The capital, Halifax, on the east coast, is situated at the head of a fine natural harbour, which

CANADA

IMPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.			—	—
	1924.	1926–30.	1931–35.		
Raw materials	—	*23·9*	*29·6*		
Coal and coke	7·9	5·5 [1]	6·6		
Petroleum and gasolene	4·8	5·1	7·9		
Silk and silk products	2·5	2·6	1·8		
Raw Cotton	3·1	2·3	2·5		
Cotton products	4·3	2·0	3·4		
Wool and woollen products	6·0	4·3	4·0		
Other textiles	1·7	1·8	4·7		
Chemicals	3·1	3·1	5·7		
Foodstuffs	—	*16·6*	*18·8*		
Fruits, nuts, vegetables	—	3·8	4·4		
Alcohol	2·4	3·5	3·3		
Sugar	5·3	3·0	3·7		
Manufactures	—	*57·2*	*51·0*		
Iron and steel [2] (raw and manufactured)	12·9	10·1	7·9		
Machinery (excluding electrical [2])	—	7·1	3·6		
Electrical appliances [2]	—	2·8	1·7		
Cars	3·2	5·0	3·6		
Textiles (included above)					
Total value in million $	*796·9*	*1116·2*	*499·2*		
Countries :					
United States	64·0	66·8	57·4		
United Kingdom	19·0	17·2	21·4		
France	2·3	2·2	1·7		
Germany	0·9	1·5	2·1		

[1] Figures for coal only, 1926–28 and 1931–35. [2] Figures for 1928–30 only.

Par rate of exchange £1 = $4·867.

in most years is free from ice all the winter through. It is the principal naval station of British North America, taken over from the Imperial Government in 1910. British troops were quartered here till the first of September 1905. The city and harbour are defended by fortifications. There are iron and steel works at Sydney in Cape Breton Island, where coal of excellent quality for smelting purposes and limestone for flux are both found in abund-

ance close beside the admirable natural harbour formed by the Bras d'Or Channel. The ore is obtained from Newfoundland. Nova Scotia furnishes nearly half of Canada's output of coal, and there are gold mines and important gypsum quarries as well as large paper mills and other factories.

CANADA

EXPORTS (INCLUDING BULLION AND SPECIE)

	Percentages of Total Value.[2]		
	1924.	1926–30.	1931–35.
Raw materials	—	*23·9*	*22·2*
Wood	10·2	8·1	6·4
Wood pulp	3·9	3·8	4·1
Furs	1·6	1·7	2·2
Chemicals	—	1·5	2·2
Copper ore and products .	1·2	1·0	3·5
Nickel ore and products .	1·0	1·5	3·5
Foodstuffs	—	*37·6*	*38·0*
Wheat	23·5	27·4	21·4
Milled wheat . . .	6·6	4·9	3·2
Whisky	—	1·7	2·2
Fishery products . .	3·1	2·8 [1]	3·7
Meats	2·1	2·0	2·2
Manufactures . . .	—	*34·5*	*28·5*
Newsprint	8·6	10·2	14·5
Cars	2·4	2·7	2·1
Rubber manufactures .	—	2·2	1·8
Total value in $ thousands	*1069*	*1256*	*599*
Countries:			
United States . . .	39·1	39·0	35·3
United Kingdom . .	37·0	32·9	37·8
Germany	2·3	2·8	1·3
Japan	2·1	2·7	2·4
France	1·0	1·2	2·2

[1] Excludes oils, but includes fish.
[2] Classes for 1929–30 and 1931–33: other years not available.

(2) **Prince Edward Island,** about the size of the county of Norfolk, is situated in the bay of the Gulf of St. Lawrence between New Brunswick and Nova Scotia. From the nearest point of New Brunswick it is distant nine miles. The capital, Charlottetown, is on a large, deep, and well-sheltered harbour. Fox-farming is an important industry. The conditions of soil and climate appear to favour the production of the finest furs. The rich red soil is well suited to oats, hay, and dairy farming.

(3) **New Brunswick,** rather less than Scotland in size, is very rich in forests, and also possesses valuable fisheries. The capital is

Fredericton, a small town at the head of navigation for steamers, on the St. John River; but the largest town and chief seaport is Saint John, occupying a fine harbour on the Bay of Fundy, at the mouth of that river. The harbour is open all the year round, is safe, easy of access, and capable of accommodating vessels of thirty feet draught, and since the port has been connected with Montreal by the 'Short Line,' a great trade in live-stock, dairy produce, and bulk-handled grain has been developed. The province is fairly rich in minerals, but there has been but little development. Iron, gypsum, coal, building stone, copper, manganese, and potash salts are found, but only coal, gypsum, natural gas, and petroleum are actively mined. Coal production is associated largely with electrical power development. Gypsum is produced from Hillsboro' quarries.

(4) **Quebec**, on both sides of the St. Lawrence, mostly east of the Ottawa, is a province approximately six times the size of Great Britain, but with the limited inhabited area above indicated. In the settled south the winter is long, snow generally covering the ground (sometimes to a depth of more than three feet) from December to April; but the summer is warm enough to grow not merely the ordinary crops of the British Isles but also maize and tobacco. About four-fifths of the inhabitants of the province are of French origin and still speak French. Of late years they have spread into the so-called Eastern Townships, on the south bank of the St. Lawrence, where the bulk of the settlers were originally English. Numbers formerly emigrated to the New England states, where they worked in textile factories.

The capital of the province of Quebec, situated at the confluence of the Charles River with the St. Lawrence, and now the lowest point at which the river is bridged. Once the head of navigation for large vessels, it has had its growth checked by the deepening of the river above the city, and by other causes; for though trans-Atlantic passengers sometimes prefer to land or start here, goods show their usual tendency in favour of water carriage without transhipment as far into the heart of a country as possible. This circumstance has accordingly favoured the rise of Montreal, now the chief seat of commerce in the Dominion. The relative growth is shown in the following table :—

	1861.	1881.	1891.	1901.	1911.	1921.	1931.
Quebec .	60,000	62,500	63,100	69,000	78,000	95,000	131,000
Montreal .	90,000	141,000	215,000	270,000	470,000	619,000	819,000

'Greater' Montreal had an estimated population of 1,300,000 in 1934.

Montreal stands on an island in the St. Lawrence, at the confluence of the Ottawa, 180 miles (by river) above Quebec. All the improvements in the communications above the port tend to increase its shipping and population. In 1906 the ship-channel up to this

point had a depth of 27½ feet, but this was increased to 30 feet in 1912 and further deepening is in progress. The trade of Montreal was greatly stimulated by the freeing of the Canadian canals from tolls in 1903. In that year nearly 20 per cent. of the shipments of grain from Chicago and Duluth passed through Canadian territory. It is now after Vancouver, its western rival, the greatest grain port in Canada. The water-power resources of the province are enormous and have been developed especially on the St. Maurice, Saguenay, Lièvre, Ottawa, and St. Lawrence Rivers. Two important storage dams have been built. The La Loutre on the St. Maurice was at the time of its construction one of the largest artificial reservoirs in the world, with a capacity of one hundred and sixty thousand million cubic feet, and the water area of 300 square miles. The storage permits a permanent flow of 12,000 cubic feet per second at Shawinigan over the famous falls, in round figures, 1,000,000 permanent h.p. are now available on this river. The Gouin dam on this river is now one of the world's largest. As a result of this hydro-electric power development power lines link all important centres on the St. Lawrence lowlands, and Quebec has become the second manufacturing province (after Ontario). A great copper smelting town has grown up at Noranda. Three Rivers, at the mouth of the St. Maurice, has become a considerable town and port. The St. François dam on the river of the same name materially assisted the numerous pulp and other mills along its course.

(5) **Ontario**, about 4½ times the size of Great Britain, is the province to the west of Quebec, extending along the north of the Great Lakes. This populous region, which is the most southerly part of the whole of the Dominion, has a much shorter winter than that of Quebec. In the south, wine is produced from native grapes, and a strip running eastwards from Hamilton and bordering Lake Erie is known as 'the garden of Canada,' from its being so peculiarly adapted to the cultivation of table grapes, peaches, and other soft fruits. Despite the rapid development of the other areas Ontario still produces more than half of all fruit grown in Canada, and the province about one-half of the milk, cheese, butter, and casein of Canada. Forests cover huge areas of the north. Ottawa, the seat of the Dominion government, stands on the river of the same name, about ninety miles above its confluence with the St. Lawrence. It is the centre of the lumber, pulp, and paper industries of the province, and has some of the largest paper-mills in Canada. The capital of the province is Toronto, near the west end of Lake Ontario, on which it has a fine harbour, and is so situated as to form the centre at which the railways running from the east parallel to Lake Ontario begin to diverge in different directions through what has been called the Lake peninsula. The town has become a great seat of manufactures and has grown almost as rapidly as Montreal

from under 100,000 in 1881 to 628,000 in 1931. Steel-works and other manufacturing industries are carried on at Hamilton at the west end of Lake Ontario, and at Sault Ste. Marie are large paper-mills and steel-works utilising by means of electricity the power of the rapids ; the power has been developed especially on the Nipigon and Ottawa Rivers and above all at Niagara. Hydro-electric stations on or near the Niagara River utilise the difference of level between Lakes Erie and Ontario (about 330 feet) for power development and the great works at Queenstown have turbines subjected to a head of 305 feet—130 more than the maximum near the falls. Sudbury, Timmins, and Kirkland Lake are large centres of mining and metallurgy. Fort William and Port Arthur on Lake Superior are great centres for the shipment of western grain. Midland and Depot Harbour (on Georgian Bay), Goderich and Port Colborne are now also important wheat-reception ports where the wheat of the west is received and then railed, in the form of wheat or flour, largely to Montreal. Cobalt, near Lake Temiscaming, in northern Ontario, was formerly famous for cobalt and silver. The other chief cities, London, Oshawa, and Windsor, like Detroit in the United States, are devoted to the manufacture of motor cars.

(6) **Manitoba**, the rich, flat, farming province in the west, is nearly three times the size of Great Britain. The capital is Winnipeg, situated at the confluence of the Red River and the Assiniboine, which comes from the west. This city is now also the place of convergence of numerous railways, and has grown rapidly as the trade centre for the wheatfields of the Prairies. Its population in 1881 was 8,000 ; in 1891, 26,000 ; in 1911, 136,000 ; in 1921, 180,000, and in 1931 had grown to 219,000. In 1881 the area under wheat in Manitoba was 51,000 acres ; in 1902, 2,040,000 ; in 1903, 2,443,000 ; in 1908, 2,851,000 ; in 1918, 2,984,000 ; in later years 3,000,000 acres was exceeded. But some of the wheat lands are now being converted to more intensive forms of agriculture, including dairying. Of the 25,000,000 acres in Manitoba classed as suitable for arable farming about one-third is so used. The northern part of the Province lies on the Canadian Shield and has huge gold-zinc mines at Flin Flon and Sherridon. There has been much development of hydro-electric power. Manitoba has now its own ocean port in Churchill, linked by rail with the wheatlands.

(7) **Saskatchewan**, consisting of the greater part of the former districts of Assiniboia and Saskatchewan, together with the eastern half of Athabasca was created a province only in 1905. It is still mainly a wheat-growing province, especially in the southern half ; the northern half is a forest and mining region. In 1905, the area under wheat was 1,130,000 acres ; in 1915, 8,929,000 ; in 1919, 10,587,000 ; in 1929, 14,445,000 (spring wheat only, winter wheat

trifling). Now the total area under cultivation is 20,000,000 acres—three-quarters under wheat. The manufactures, although still relatively unimportant, increased fifteen times in value between 1905 and 1926. Flax-growing has been encouraged, both for seed and fibre. The most important centres are the capital, Regina, Saskatoon, Moosejaw, and Prince Albert. The south has vast lignite fields, the north gold-fields in the Lake Athabasca region.

(8) **Alberta**, consisting of the former district of Alberta with the western half of Athabasca and strips of Assiniboia and Saskatchewan, was also made a province in 1905. It originally owed its settlement to the advantages of cattle-ranching offered by the natural pastures to the east of the Rocky Mountains, but has attracted agricultural settlers who grow oats as well as wheat, at first largely winter wheat. In 1905, the area under wheat was 107,000 acres (of which 32,000 winter wheat); in 1915, 2,138,000 wheat (40,000 acres winter); in 1919 the total wheat, 4,283,000 (41,000 winter); in 1929, 7,551,000 (128,000 winter). The latter figure is being maintained. No doubt the region benefits from the chinooks. In the south sugar-beet is grown under irrigation. The capital is Edmonton, on the Saskatchewan River, and at a point to which railways are giving increased importance. The province is very rich in coal, which is mined near Edmonton, at Anthracite, Mountain Park, Drumheller, Canmore, Lethbridge, and elsewhere. Natural gas is abundant and is used extensively, and oil is being developed. Calgary is now an industrial centre. Canada has paid much attention to the tourist industry and has established vast national parks. In this province are the world-famous Jasper, Banff, and Buffalo National Parks.

(9) **British Columbia** is a province four times the size of Great Britain, comprising on the mainland the area from 350 to 400 miles in width between the coast and the Rocky Mountains, composed of high tablelands and lofty mountain-ranges separated by deep and narrow valleys, but also including Vancouver Island and the coastal archipelago to the north as far as the Queen Charlotte Islands inclusive. Its wealth consists chiefly in minerals, forests, and fisheries. British Columbia produces about one-seventh of the mineral output of the Dominion, a third of the forest output, and nearly a half of the fishery output. The discovery of gold first brought a rush of settlers here in 1856, but the deposits then discovered were worked out. Since 1895, however, gold, silver, copper, lead, and zinc mining have all been carried on. Lead, silver, and zinc are now mined in East and West Kootenay; copper near Howe Sound (Britannia mine) and at Allenby; auriferous copper ores are worked in the Rossland and Boundary district near the southern border of British Columbia; gold is also still worked in the famous streams of the Klondike (old Yukon Territory). Coal

is mined and converted into coke at Fernie in the Crow's Nest coal-field for use in the smelters, refineries, and fertiliser plants at Trail. Copper is also found on Texada Island, where there exist also deposits of iron ore. The oldest and most important coal-mines of the province are those of Nanaimo on the east side of Vancouver Island, and Comox, further north. Coal is also mined in the Nicola Valley and in the country traversed by the Tulameen and Similkameen Rivers. British Columbia is steadily advancing to the front as an agricultural province with the aid of irrigation. The rich valleys and lowlands in the interior offer favourable conditions for fruit-growing and dairying. Of these the Okanagan valley contains the largest area of fruit lands in the province. Apples of excellent quality are exported in large quantities to the English and other markets, and peaches, nectarines, apricots, and vines are successfully grown. The forests of the coast range, composed of gigantic pine and fir trees, are among the grandest in the world. The capital of the province is Victoria, on a beautiful harbour at the south-east end of Vancouver Island. It has a considerable *entrepôt* trade. Any vessel passing through the Straits of Juan de Fuca on its way either to Vancouver or Seattle must pass Victoria, and the majority call. Esquimalt, on an excellent harbour adjacent to that of Victoria, has an arsenal and graving dock. Vancouver, whose harbour, at the mouth of Burrard Inlet, can accommodate the largest liners alongside the wharves, and New Westminster, near the mouth of the Fraser River, are the western termini of the two great trans-continental railways. Mail steamers run regularly from Vancouver to Japan, China, Australia, Hawaii, New Zealand, Alaska, Seattle, and San Francisco. Indeed, the quickest sea-land route from London and New York to the Far East is *via* Vancouver. New Westminster, a lumber port, suffers from the sand bar which persists in forming across the mouth of the Fraser River, giving only 14 feet of water at low tide. Since the opening of the Panama Canal Vancouver has become a centre for shipment of lumber and metals as well as prairie wheat for Europe and the east of America, in recent years also to eastern Asia (the Orient) as the following table shows:—

WHEAT EXPORT FROM VANCOUVER IN MILLIONS OF BUSHELS

	1920–21.	1921–22.	1922–23.	1927–28.	1935–36.
Europe	0·5	4·06	14·86	79·0	56·7
South America	—	—	0·33		
Orient	—	3·44	3·83		

Vancouver in 1891 had a population of only 14,000. By 1911 this had increased to 100,000, and now the population of 'Greater Vancouver' is over 300,000. Prince Rupert, the port on Kai-En Island, is a terminus of the Canadian National Railway (formerly Grand Trunk Pacific). A large dry dock was opened here in 1921.

It is about 3,860 nautical miles from Yokohama, 500 miles nearer than any other Pacific port.

Northern Canada. The remainder of the Dominion is divided into the North-West Territories (divided into the three provisional districts of Franklin (the northern islands), Keewatin, and Mackenzie) and the Territory of Yukon. They all yield fur, and the Yukon territory is rich in gold and silver. It is here that the Klondike gold-field, on which Dawson City now stands, was discovered in 1896. Access to the region is now facilitated by a railway from Skagway, over the White Pass, to a navigable river of the Yukon basin. The gold occurs both in alluvial deposits and in quartz, but the most easily worked deposits are exhausted. The production of gold in the Yukon district increased from a value of about £60,000 in 1896 to £500,000 in 1897, and £4,450,000 in 1900, then decreased to less than £1,000,000 in each of the three years 1907–9. In 1930 the value was £136,000. The population dropped from 27,000 in 1901 to 4,000 in 1931, and Dawson City has less than a thousand people. Extensive oil-fields were discovered in the Mackenzie River district in 1921. There are many who are convinced of the value of Canada's ' Arctic Prairies ' and great herds of reindeer were driven into this area from Alaska in the years 1932–36.

The great north is developing in other ways. There are silver-lead mines at Mayo, radium and silver deposits near Great Bear Lake, and gold-fields at Yellowknife. The ubiquitous aeroplane and caterpillar tractor now link all developed centres in this northern region.

Towns of Canada, 1931

Montreal	819,000	Calgary	84,000
Toronto	631,000	Edmonton	79,000
Vancouver	247,000	London	71,000
Winnipeg	219,000	Windsor	63,000
Hamilton	156,000	Verdun	61,000
Quebec	131,000	Halifax	59,000
Ottawa	127,000	Regina	53,000

NEWFOUNDLAND

Newfoundland is a British Dominion, to which belongs not only the island of that name but also the dreary coast and a considerable inland tract of Labrador. Owing to financial difficulties the government of the United Kingdom assumed responsibility for the government and finances of Newfoundland in 1933. The present population (under 300,000) is composed chiefly of fishermen, settled on the coast. The island is known, however, to be rich in minerals, especially coal and iron, as well as in timber, the coal-fields, situated in the south-west, being a continuation of those in Cape Breton

Island. A railway has been made from St. John's, the capital of the island, on the east coast, through country adapted for agricultural settlements as well as through the coal-fields, to the west coast. Iron ore of excellent quality is now mined with remarkable ease on the small island known as Great Bell Island in Conception Bay within eighteen miles of St. John's. These Wabana deposits, as they are called, contain on the average about 54 per cent. metallic iron, and are comparatively free from deleterious ingredients. They pass from the island under the sea, and the amount of ore on the island was estimated by Mr. Howley, director of geological survey of Newfoundland, in 'The Iron Resources of the World' (vol. ii. p. 272), at about 113,000,000 tons, with a possible submarine reserve of 3,523,000,000 tons. There are large paper and pulp mills at Grand Falls and elsewhere.

BERMUDA

The Bermudas are a group of small islands about 750 miles to the south of Nova Scotia lying in the path of the Gulf Stream and hence producing tropical and temperate fruits and vegetables, and frequented by invalids for the sake of their equable climate. Indeed, a great development of the Bermudas as health and pleasure resorts has taken place in recent years. They lie within two days of the United States coast (677 miles from New York), and being a British Colony, did not come under the Prohibition laws of that country (compare Bahamas). The area is only 19 square miles and no motors are allowed. Winter visitors number 30,000.

UNITED STATES [1]

The compact territory of the United States, between Canada and Mexico, extends over an area of about three million square miles, or more than thirty-three times the area of Great Britain. Physically this territory is a continuation of that of Canada. In the west the mountains of British Columbia are prolonged into Washington, Idaho, and Montana. In the middle the plains and prairies are similar in the two countries, and the south-eastern highlands of Canada form the northern extremities of the Appalachians. Almost the entire population of the United States is of non-American origin, being composed either of immigrants or descendants of immigrants from Europe, or of descendants of African negroes originally introduced as slaves on the southern plantations. It is in a large measure due to this cause, and to the fact that the development of the population has from the first depended in a great measure on commerce with Europe, that the density of population is still greatest in the east, and above all in the vicinity of the great seaports from Massachusetts Bay to Chesapeake Bay. There is, however, a steady movement of the centre of gravity of the population towards the west and the movement was one degree of longitude or more for each decennial census from 1810 to 1910.

Until recently there was no other region in the world with so vast a field for immigration under the existing economic conditions, and hence no other state has had its population steadily reinforced by so abundant a stream of foreign settlers. In the ten years 1877–86 the total number of immigrants was upwards of 4,200,000 and in one year (1882) the number approached 800,000. In two years the number of immigrants from Europe exceeded 600,000. Till near the end of the eighteenth century the United Kingdom furnished the largest contingent of immigrants from the earliest date from which statistics are obtainable, but from about the middle of the nineteenth century the German quota approached and occasionally exceeded the British. In recent years a change has taken place in the character

[1] I am indebted to my colleague, Professor Ll. Rodwell Jones, for valuable comments on this section, and especially to a group of American geographers who have revised the whole.

of the immigration. In the ten years ending June 30, 1890, the United Kingdom and Germany together furnished rather more than 55 per cent. of the immigrants; in the ten ending June 30, 1910, less than 14 per cent.; the contingents supplied by Austria-Hungary, Italy, and Russia (including Poland) in the same periods were equal to 24½, 23, and 18 per cent. of the total respectively. In the four decades ending with June 30, 1880, 1890, 1900, and 1910, the total number of immigrants in millions was 2·8, 5·2, 3·8, and 8·8. In the last five years before the War, that is, the five ending with June 30, 1914, the number of immigrants was 5·2 millions, in the next five, 1·2. Immigration of any nationality was restricted for 15 months beginning April 21, 1921, to 3 per cent. of the population of that nationality in the country at the census of 1910. Under this quota the last year of considerable immigration was 1923–24 (241,709). During the great depression with consequent unemployment which followed, immigration fell greatly—to a minimum of 23,068 in 1932–33, a figure far exceeded by the emigrants. A large number of the non-European immigrants are from Canada, and hence in the first instance likewise of European origin. Chinese immigration was at one time considerable (380,000 were admitted between 1820 and 1934), but is now practically prohibited. The same is true of the Japanese of whom 277,000 have been admitted but of whom departures now exceed arrivals. The negro population, though not recruited by immigration, is multiplying rapidly by natural increase (excess of births over deaths), but the small native Indian population is dwindling away or becoming absorbed. In 1900 the negro population of the United States (almost confined to the south-east) was 8,841,000, as against 7,489,000 in 1890; in 1910, 9,828,000, both showing a lower rate of increase than the general average of the population. In 1920 the figure was 10,463,000 the rate of increase 1910–20 being 6·5 per cent. The natural increase of the white population (excluding immigrants) was 11·6 per cent. for the same decade. In 1930 the total was 11,891,000 against 108,864,000 whites and 2,020,000 other races (mainly Mexicans and Indians).

In relation to the commerce of this vast region, it is highly noteworthy that there are special circumstances both in the history of the country and in the physical features of its territory, that have favoured the unity of its government. In consequence of this unity there is free trade here, as in the Dominion of Canada, from ocean to ocean; and though the individual states have each legislative powers within certain limits, there could be no more striking illustration of the importance to commerce of the central government than the passing, in February 1887, of the Interstate Commerce Act, which may be briefly described as an Act prohibiting local and individual preferences on the greater highways of commerce

throughout the length and breadth of a territory four-fifths the size of Europe. The seat of the Federal government is Washington.

If we look at this unity of government from an historical point of view, there are several important considerations to bear in mind. The separate 'plantations' or colonies that ultimately formed the first United States grew up independently from several convenient starting-places, like the Australian colonies and the republics of South America. They grew up under English influence indeed, and with a common language, but this would not in itself have sufficed to make them one, and it was perhaps fortunate that when they had become strong enough, they were united in a common war against the mother country; fortunate, too, that, when that war was over, the common burdens which it entailed necessitated a common government, and that the great state thus formed held such a preponderance in the middle of the continent that it easily acquired in course of time all the present territory by purchase or conquest. And it was likewise fortunate that, when the practice of slavery in the southern states threatened a permanent division, the North should have been strong enough, in virtue of its more rapid development by immigration, to conquer the South by mere force of wealth and numbers (1861–65). In the course of this war the slaves of the seceding states were declared free by proclamation of the President of the Republic, and immediately after the conclusion of the war an amendment to the constitution of the United States abolishing slavery throughout their territory was duly adopted.

Physically the circumstance most favourable to union is the fact that the central region is one great plain communicating freely with other plains and lowlands in the east, and in the west sloping imperceptibly up to the tableland which forms the base of the Rocky Mountains, and that this great central plain is traversed by some of the grandest navigable rivers in the world. Though this factor became of minor significance after the development of the railways, it was of the greatest significance earlier. The eastern and larger portion of this central region, from about 100° or 101° W., has a fertile soil and adequate rainfall, so that everything has combined to favour continuous and progressive settlement. As settlement went on nearly every part of it has had the great advantage of easy communication with other neighbouring settled districts.

The Mississippi, the great waterway running north and south through this region, is continuously navigable for steamers of considerable size to Minneapolis at the lower end of the rapids below the Falls of St. Anthony, on the parallel of 45°, that is, to within four degrees of the northern frontier. The portion of the river from this point to St. Louis is spoken of as the Upper Mississippi. The river traverses a region in which the products of temperate and tropical climates are brought closer together than in any other part

of the world, and, before the introduction of railways, formed principal channel of communication between districts with diverse wants due to diversity of production. Even yet, it is some importance as an auxiliary means of communication. To-d there is little traffic and it is difficult to believe that as recently 1887 more freight was floated on the Upper Mississippi in ei months than any of the three great trunk lines of railroad carried a year, and at about one-third the rate. Recently there has be some resuscitation, at enormous expense, for example by Fede Barge lines. The navigation of the lower river was naturally ev more important, especially below Cairo at the confluence of i great left bank tributary the Ohio, which is navigable for steame drawing up to 9 feet at all times in the year, as high as Pittsbur (in about the same latitude as New York), where the river is form by the union of two other navigable streams. The one inte ruption referred to is in the form of rapids, avoided by a sho canal at Louisville, and for small steamers these rapids are n insurmountable. To St. Louis, about 1,270 miles above Ne Orleans (though only 600 miles direct), vessels drawing 16 fe can ascend during the high stage of the river, which usually begin in May or June and lasts for about three months, but the bul of the business was done in boats of 8 feet draught or less. Beside the disadvantage of a very winding course the river suffers fro unstable banks. Even in the quietest state of the river landslip are constantly occurring, and the population on its immediat banks is relatively small. On the other hand, traffic was promote by heavy cargoes collected on the banks of the river and its feeders Pittsburgh coal, as already indicated, and elsewhere timber, fo which St. Louis and Cairo are great storage places. In illustration of the importance of this navigation it may be mentioned that a 'tow-boat' (or stern-wheel steamer used for propelling cargo boats) has been known to proceed down the stream from Louisville, pushing before it thirty-seven barges with a total cargo (including that of the propelling steamer) equal to nearly 26,000 tons, and by this system coal is known to have been carried from Pittsburgh to New Orleans, a distance of 2,000 miles, at the cost of about 60 cents, say 2*s.* 6*d.*, per ton, equal to ·015*d.* per ton per mile. The river traffic dwindled in face of railway competition, but later the Federal government resolved to promote the revival of river traffic as a relief to the then congested railways. In 1918 it voted 8,000,000 dollars for the improvement of the Lower and 3,600,000 for that of the Upper river. Unfortunately, the bulk of the internal commerce now moves from east to west, whereas the river flows from north to south.

The Cumberland and the Tennessee, on the left of the Ohio, and the Wabash on the right, have likewise considerable stretches of navigable water. The Red River, the Arkansas, and the Missouri,

the great right-bank tributaries of the Mississippi, are also all navigable for hundreds of miles, the Missouri for more than two thousand miles, steamers being able to ascend it uninterruptedly to the Great Falls, about 100 miles below the gorge known as the Gate of the Rocky Mountains. With the advent of railways traffic declined and there has, actually, been no commercial traffic on the Upper Missouri since the nineties of last century. In the same great plain, but outside of the basin of the Mississippi, the Red River of the North, which flows northwards into Canada, is navigable for steamers to Fargo, a point about 200 miles in a direct line from the limit of continuous navigation on the Mississippi.

The Appalachian Mountains in the east, and the Rocky Mountains and other chains in the west, form an interruption to communication in this, among other ways, that they cause the rivers which cross them to have their navigation interrupted by rapids. It is partly on this account, partly on account of their smaller size, that the rivers of the Atlantic coast are of less importance than those of the great plain as navigable streams ; but it must be remembered that some of them (the Hudson, Delaware, Susquehanna, Potomac, and James River), are of great value to commerce as forming, like the rivers of the British Isles, fine harbours in their estuaries ; and the inland navigation of the Hudson, a broad, deep river, navigable for large steamers to the latitude of the Catskill Mountains, for smaller ones to the falls at Troy, is of great importance, and was the first cause of the growth of the greatest of all American seaports (New York).

The Columbia River, the principal navigable stream belonging to the Pacific drainage of the United States, has its navigation frequently interrupted by falls and rapids, and so too has its chief United States tributary, the Snake River. On the main stream, the lowest interruption of this nature is the Cascades, 165 miles from the mouth, but costly works now allow of navigation being continued past this obstruction.

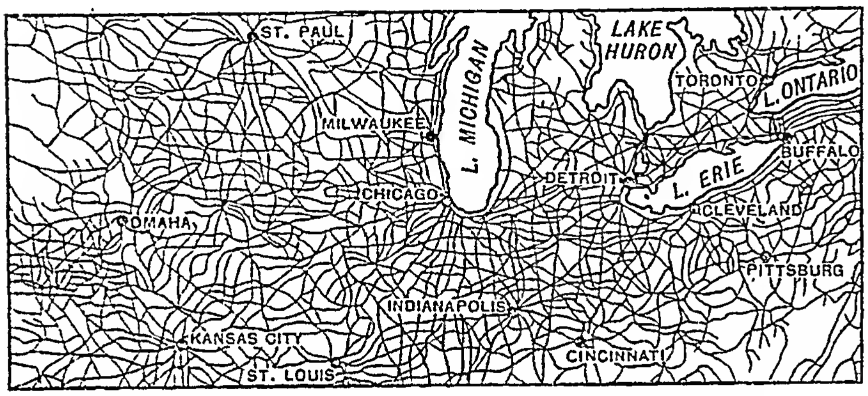
The obstacles presented to the laying of railways by the great mountain chains in the east and west are less perhaps than might have been expected from the extent and height of the mountains. The gradual slope of the ground up to the base of the Rocky Mountains has facilitated the laying of railways to the foot of the passes, and several routes have been discovered along which railways could be advantageously laid across these and other western mountains. A comparison of the three most important of these routes with the great Canadian route is given under Canada (see p. 709) ; and here it may be added that the Californian valley, physically the most isolated of all the more productive regions of the United States, is now connected by rail with the rest of the country by lines laid across the mountains on the north, east, and south.

In the case of the Appalachian Mountains (that name being now used as a general term for all the mountain ranges in the east), it is an important physical feature of the United States that in the north-east, precisely where population is densest, mineral wealth most abundant, the connections between east and west most important, that system breaks up into a great number of smaller mountain ranges with many gaps between them, facilitating railway and canal construction. To this region belong several of the most serviceable canals of the United States, among others the Erie and Champlain canals. The Erie Canal, laid through the Mohawk valley, serves to connect the navigation of the Great Lakes with New York, starting from Buffalo at the eastern end of Lake Erie, and proceeding eastwards to Troy and Albany on the Hudson. It was opened in 1825, and the fact that New York then first came to exceed Philadelphia in population will serve to give an idea of its importance at that date. Its largest dimensions on the old route admitted of barges of at most 250 tons. The new Erie Canal, 12 feet deep, passing through Oneida Lake, adapted to barges of 1,000 tons, was opened in 1918. Its western termination on Niagara River is at Tonawanda, from which point connection is established with Buffalo, partly by the river, partly by the Black Rock Canal, which has a depth of 22–23 feet, opened in 1914. The Champlain Canal connects the eastern end of the Erie Canal (now called the New York State Barge Canal) with the head of Lake Champlain, and thus completes the waterway between New York and the St. Lawrence. The Cape Cod Canal, opened in 1914, cutting across the hook-shaped peninsula in the east of Massachusetts, reduces the distance between Boston and New York from 334 to 272 miles, and enables vessels to escape the risks of the voyage round the Cape, where wrecks used to average 35 a year. Its depth at mean low water is 25 feet.

Since the construction of the Erie Canal the fertile lowlands of the Mississippi basin have had the advantage of two great waterways in communication with the ocean, and more or less competing with one another and affecting the competition of railways running in different directions. This may be illustrated by an account of an important part of the trade of St. Louis, the great commercial centre on the Mississippi, a little below the confluence of the Missouri. Here reside the merchants who handle a large part of the grain grown in the region to the west, including eastern Kansas and Nebraska. The nearest ports for that grain are Galveston and Houston, which latter port is now connected with Galveston Bay by a channel 25 feet deep. If the railways to these ports become congested, and are consequently disposed to charge too high rates, the merchants can apply for rates by rail or river to New Orleans, by rail to Baltimore or some other eastern port, or partly by water

by the route here spoken of to New York. The grain traffic by the old Erie Canal declined very rapidly,[1] but this did not prevent it from having a great influence on the cost of carriage.

The physical features that favoured the construction of the two waterways from New York are still of great importance for the railway connections of that port. The Hudson and Mohawk valleys allow of railway connections with easy gradients between New York and Chicago (the 'sea-level' route of the New York Central Lines), and at one time this was the only route for the great expresses between these two cities, even although in following this



RAILWAY MAP OF A PORTION OF THE UNITED STATES

Natural Scale 1 in 18,000,000

route one has to run for 140 miles north before turning westwards. This route still competes easily with the more direct but more difficult route through the Alleghany Mountains. It is these physical features which no doubt have enabled New York to beat Boston in competing for the bulk of the traffic with the important hinterland of which Chicago is the centre. Boston is cut off from that hinterland by the Hoosac Mountains in the west of Massachusetts, through which there was no railway tunnel till 1875. Even now that route appears to be a difficult one, for a large part of the traffic of Boston with the west passes through New York. While the Hudson and Mohawk valleys afford an easy route between New York and the west, the Hudson, Lake Champlain, and Richelieu

[1] In 1886 the cost of carriage of a bushel of wheat from Chicago to New York was 16·5 cents by an all-rail route, 12 cents by lake and rail, and only 8·71 cents by lake and canal. In that year upwards of 45 millions of bushels of grain and flour were carried through the Erie Canal. In 1900, the corresponding rates were 9·98, 5·05, and 4·42 cents, but the total movement of wheat on all the New York State Canals (of which the Erie Canal is one) declined from 37·6 millions of bushels in 1862 to 4·6 millions in 1900.

valleys afford an equally easy route running almost in a straight line due north between the Adirondacks and the White Mountains to Montreal.

In the southern part of the Appalachian system, that to which the name of Alleghany Mountains is sometimes confined, the ranges are higher and more continuous, and there is still a stretch of nearly 300 miles with only one railway across it, and immediately to the west of that stretch there lies one of the most sparsely peopled districts of the eastern states.

With regard to **climate**, we have in the United States, as in Canada, to note differences as well as resemblances in comparing different parts of the country with corresponding parts of Asia and Europe. The continuous territory of the United States, that is, the territory belonging to it on the mainland of North America exclusive of Alaska, may be divided into four climatic regions with characteristic products, two east and two west of the meridian of 100° W., though the boundaries must be recognised as more or less arbitrary.

The main agricultural products of the United States are mentioned under the four sections into which this vast country is divided below, but two general observations may here be introduced. Professor Russell Smith has pointed out long ago that both in the north and south of the United States, crops like maize, cotton, and tobacco are widely grown, which, unlike the prevailing European cereals, do not cover the surface, and thus leave much soil between the plants liable to be washed away. The problem of soil erosion and of the disastrous floods which result from the rapid run off from the eroded surfaces has become a matter of the most serious import in the last few years. The Federal government has now set up a special service to deal with the subject. The development of agriculture in the United States during the twentieth century is in marked contrast to that in the nineteenth. In the nineteenth century we saw an expansion, a movement westwards, especially after the Civil War of 1861–65. In the twentieth century the progress has been along three lines: (1) reclamation by drainage, irrigation, and other means; (2) the more active and constant use of good land already worked; but the elimination of farms established in unfavourable positions on 'sub-marginal' land, *i.e.* beyond the pioneer 'fringe'; and (3) more intensive cultivation and organisation. Dr. O. E. Baker has distinguished in the United States a number of agricultural regions which may, however, be grouped together roughly in the old four main divisions distinguished by Chisholm.

A. The North-east.—This region lies north of the Ohio and Delaware Bay, and comprises, among others, the New England States. It corresponds with the same latitudes of eastern Asia chiefly as regards extremes of temperature, for it has not the very dry winters of the corresponding parts of Asia. In this region

the inhabitants are almost all of European origin, and the products are similar to those of Europe. The eastern portion of it is the most densely peopled part of the United States, and that in which manufacturing industries have long been most highly developed. The western half of it is the great maize- and wheat-growing portion of the country ; the north-west including the Red River valley. According to Baker's scheme, it includes a north-eastern hay and dairying region and then the great corn belt, with a belt of intensive fruit farming along the Atlantic coast.

B. The South-east is a region in which cotton, maize or corn, and tobacco are grown as staples. The climate, though not generally good for wheat, is well adapted for maize and southern fruits, including the ground-nut, or, as it is more commonly called in America, the pea-nut, the American representative of the walnut known as the pecan nut,[1] and, in the far south, in spite of occasional disaster, even the orange. Negroes in this region form a large proportion of the population in the states on both sides of the lower Mississippi, even outnumbering the people of European descent. Here the correspondence with the same latitudes in the east of Asia as regards rainfall is closer. There is for the most part a decided preponderance of summer rains, though the winters are far from rainless. The difference as regards temperature in the parts exposed to northerly winds is already noted on p. 699. The rapid growth of arable farming in the sandy ' pine barrens ' as they are called, which occupy a large portion of the coastal plain from North Carolina to the lower Mississippi, a process of reclamation facilitated, it should be mentioned, by the neighbouring supplies of phosphatic fertilisers, is a notable feature. This region comprises Baker's sub-tropical belt, along the shore of the Gulf of Mexico and covering Florida, then his great cotton belt which is succeeded to the north by the corn and winter wheat belt.

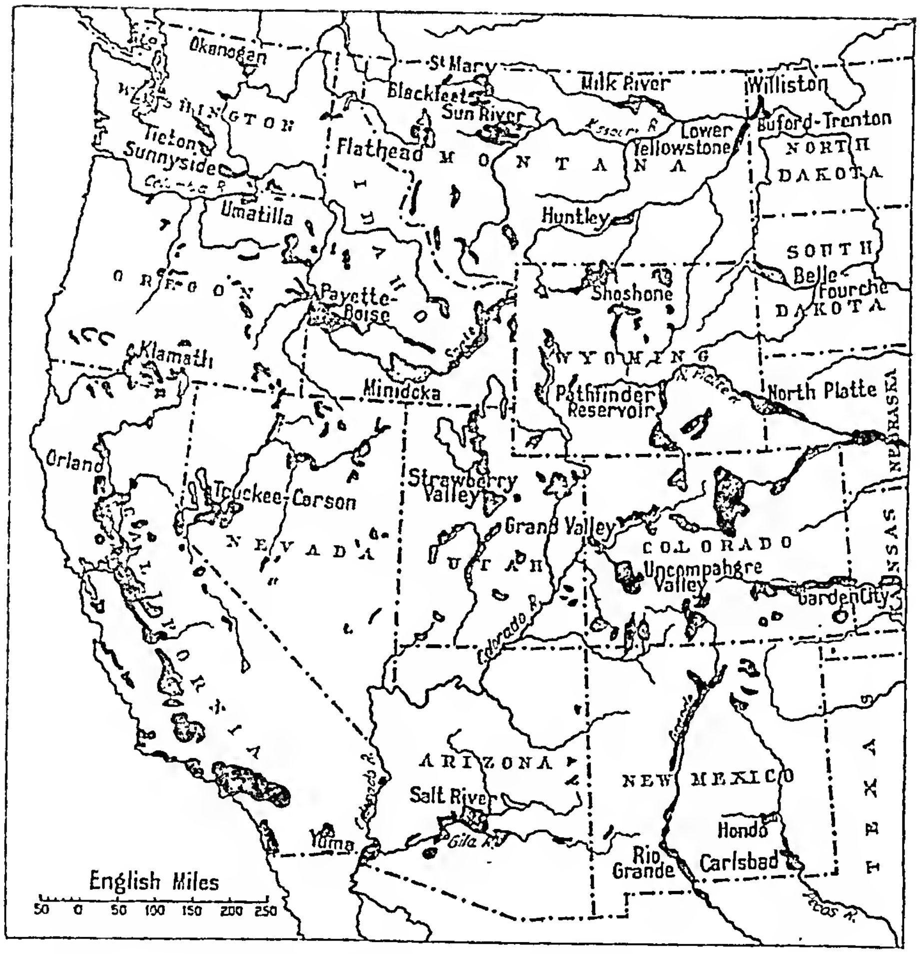
C. The region between 100° and 120° W. (mostly tableland), comprising an area of about 1,200,000 square miles, may be described as the arid region of the United States, inasmuch as throughout its extent except in the neighbourhood of mountains, and near the northern frontier, the rainfall is too scanty for agriculture without irrigation. Here, therefore, we find the great majority of the irrigation schemes of the United States as shown on the accompanying map. This region corresponds in the north to the southern part of Western Siberia, and in the south to the arid and almost rainless tracts of Asia forming Russian Central Asia. The part of this region lying east of the Rocky Mountains and sloping gently downwards is known to American geographers as ' the plains ' or short grass prairies. It is a sheep and cattle rearing region. The western part, consisting of mountains and tablelands, is rich in metals.

[1] The fruit of a species of hickory, genus *Carya*, which is closely akin to the walnut, genus *Juglans*.

D. The Pacific Coast has a climate very closely corresponding to that of the same latitudes in the west and south of Europe and northern Africa. In the north the rains are very abundant west of the mountains. As we pass southwards we come to a climate closely resembling that of the Mediterranean region, the summers nearly rainless, the winters mild. The difference between the coastal climate with low summer temperatures due to the prevalence of fogs, and the climate of the Great Valley of California with a lower rainfall but higher temperatures, should be carefully noted. Gold, which first attracted a large population to this part of the world, is still an important product, but the fine Californian valley, watered by the Sacramento in the north and the San Joaquin in the south, now teems with wheat, barley, grapes, and southern fruits, and excellent wheat is also grown on both sides of the Columbia River, and on the Snake River Plateau, as well as in the valley of the Willamette, between the Coast and Cascade Ranges. In southern California various fruits and even wheat and barley are grown by irrigation, the water for which is obtained on the uplands by means of canals, on the low grounds from artesian wells. The earliest recorded canal was opened in 1835 ; the first in the Anaheim district in 1856. Nearly all the oranges and other citrus fruits are grown on the uplands, which are less liable to fogs than the low grounds. The fruits of California—oranges, grapefruit, lemons, apples, prunes, raisins, and dried peaches—furnish, along with rice (since 1909) and wool, the great bulk of the eastward traffic of the middle and southern trans-continental railways. On the mountains the forest scenery is highly remarkable. Dense forests of giant conifers cover the slopes, and a great timber trade has grown up round Puget Sound (Washington), at Seattle, Tacoma, Bellingham, and other ports.

The changing foreign trade of the United States will be most conveniently studied in detail with reference to the tables given below. In examining these tables two considerations must be borne in mind. In the first place, the foreign commerce of the country is greatly affected by the maintenance of a customs tariff calculated to foster native industries, in consequence of which there is an immense amount of manufacturing industry for home consumption of which these tables give no idea. Secondly, it must not be inferred that because certain agricultural products are largely imported into the United States, they are unsuited to the climate. The high price of labour in the country excludes or limits the production of certain commodities, such as sugar (to some extent), tea, and raw silk, for which the climate of the United States in some part of their territory is in no way unsuited.

The table of exports suggests the inference that the United



Principal Irrigation Projects in the Western United States

The black areas show the principal irrigated tracts in the Western United States in 1935.

States remained on the whole pre-eminently an agricultural country, at least till the War, and this is still largely true notwithstanding the immense increase in recent years in the number of those engaged in manufactures and mechanical and mining industries. It shows on a comparison of the period 1881–85, the first after the Civil War in which figures could be obtained fairly comparable with those of countries having a currency on a gold basis, with the period of four years ending June 30, 1914, that the exports of machinery, iron and steel wares, leather and cottons increased from an aggregate of 5·6 per cent. of the total value of the exports to 21·6 per cent. of that value.

The unfavourable circumstances affecting the cultivation of wheat generally (see p. 125) caused the area under wheat in the United States as a whole to remain practically stationary for the years from 1880 to 1896, the area under maize growing all the more rapidly. The extent of land now occupied by this crop is about twice as great as that under wheat, and its produce is about three times as much as that of the latter. The acreage of wheat, now between 50 and 60 million, is about double what it was in 1880, whereas the population is 150 per cent. greater. The much smaller export of maize than of wheat is due to the fact that the bulk of the former crop is employed in the United States in feeding swine and other animals, so that the production and export of bacon, hams, lard, cattle, and beef, as well as maize, may all be regarded as representing this branch of American agriculture.

The timber export of the United States takes place mainly from the Pacific states of Washington and Oregon. In the other forested areas cut now exceeds growth, and large timber is practically exhausted. Pensacola, 55 miles east by south of Mobile, is the chief place of export of famous pitch-pine from the sandy 'pine-barrens' of Florida and the neighbouring states.

Cattle are most numerous in the United States east of the meridian of 100° W., especially in the states occupying the northern part of the basin of the Mississippi. Dairy farming is carried on in New England and south of the Great Lakes; pig-rearing in the maize belt south and west of Chicago. It is in the western states, however, that sheep are most numerous relatively to population, the drier climate there prevailing being favourable to the rearing of that animal, but the total number of sheep is limited. Sheep, moreover, are now being reared more for meat than wool, and the merino is tending to disappear.

Among the agricultural deficiencies of the United States, which the import table betrays, attention may be drawn to two, sugar and coffee. Sugar, except in 1911–13, has held the first place among the imports of the United States from the earliest period entered in the table, 1875–80. There is, however, a considerable home produc-

tion, especially in Louisiana of cane sugar, and beet sugar in various states such as Colorado and Michigan. The ordinary fruits of the colder temperate climates flourish in the United States as well as in any part of the world, and are produced in sufficient abundance to leave a surplus for export. There was formerly a large import of Mediterranean fruits ; of these a large supply is now home-grown in California and Florida and the surplus has become a very important item of export. On the other hand, bananas are imported in large quantities from Central and South America and the West Indies. Coffee has always been a leading import and rubber has assumed great importance of recent years. A good deal of rice is grown in the swamps of Louisiana and latterly under irrigation in southern California.

The mineral resources of the United States are enormous. Besides coal and petroleum, the United States now produce more iron, copper, zinc, lead, and aluminium, than any other country, in addition to being second amongst the producers of gold and silver.

Coal is produced both in the form of anthracite and bituminous coal, as well as lignite. The total production increased with very rapid strides during the latter part of last century. The production of 1886 was more than three times that of 1870, and more than seven times that of 1860. The great Appalachian fields, lying in the eastern states, yield 70 per cent. of the output which, apart from the years of depression, now averages 500,000,000 tons or a third of the world's total. The largest producing state is Pennsylvania with a quarter of the coal and most of the anthracite. Anthracite is produced in several small fields in the east of the state, the centre of the region of production being about 200 miles from New York and 125 miles from Philadelphia. Access is afforded to the productive region by the valley of the Delaware, with those of its tributaries, the Schuylkill and the Lehigh, and in all of these valleys there is water communication (by canal or river), as well as, of course, abundance of railways. Bituminous coal is produced chiefly in the west of Pennsylvania, the large manufacturing town of Pittsburgh being situated about the centre of production. To this region belongs most of the coal used in making coke in the United States ; a leading centre of coke-making being Connellsville, about 40 miles south-south-east of Pittsburgh. The Clearfield coalfield, situated to the north-east of the Pittsburgh area nearly due west of New York, supplies the best steam-coal in the neighbourhood of the northern Atlantic ports. The bituminous coal region of western Pennsylvania likewise extends into the adjoining states of West Virginia and Ohio, in the latter of which quantities of coal are produced in the neighbourhood of the Ohio River. The Pocahontas coalfield, on the borders of Virginia and West Virginia, furnishes the best of all American steam-coal, to a limited extent exported

by way of Norfolk and Newport News. Farther west another productive coal region extends from the west of Indiana through Illinois to the east of Iowa ; and Illinois ranks after Pennsylvania and West Virginia in the total amount of its production. Among the Appalachian ranges in eastern Kentucky and Tennessee and northern Alabama, are other coalfields or actually other parts of the Great Appalachian field, with a rising production, and many others are scattered over different parts of the United States territory. It will be noted that the Pittsburgh coal is conveniently placed for shipment over the Great Lakes to Canada, but not one of the United States fields is situated so conveniently for the export of coal as those of Britain. Details of the utilisation of American coal are given above (p. 244).

The **iron ores** of the United States are likewise very abundant and very widely distributed. Many of them also are of excellent quality. But the chief supplies of ore are at a great distance from the smelting fuel. Nowhere in the country are the best steel-making ores found in proximity to smelting coal. The Lake Superior region, which in recent years has yielded five-sixths of the iron ore produced in the United States, is, however, conveniently situated to the Great Lakes, which facilitates cheap transport by water.

Of the iron-ore ranges near that lake the first discovered was the Marquette Range in Michigan. It has been worked since the year 1885. The Menominee Range, a little to the south, was discovered in 1877, the Vermilion Range in Minnesota, in 1884, the Gogebic in Wisconsin in 1885, and the Mesabi in Minnesota not till 1892. This last discovery is the most important on account of the extraordinary facility with which the ores can here be worked. The deposits were originally covered merely with a skin of glacier drift. This having been removed, railway lines are laid to the ores, and these having been loosened by blasting when necessary, are then dug and loaded on the trucks by steam-shovels. It is in a large measure the development of these and other mineral areas, together with that of the agricultural and more particularly the wheat region to the north-west, that led to the huge traffic through the Sault Ste. Marie canals.

For smelting, the general rule prevails in the United States, as elsewhere, that the ore is brought to the fuel, rather than the fuel to the ore. It is for this reason that the great centre of the iron industry of the United States is Pittsburgh, which in the early stages of the industry had the advantage of local supplies of ore as well as coal ; and has likewise the advantage of being situated where two navigable streams unite to form the Ohio. Some of the local supplies were long ago exhausted, and their total amount is scanty, but Pittsburgh still has the advantage of fuel in a higher degree than


Miles
0
500
Lake Superior
Ottawa
ME.
VT.
N.H.
MASS.
Boston
CONN.
R.I.
N.Y.
Lake Ontario
Lake Huron
Lake Michigan
Lake Erie
WIS.
apolis
NN.
Detroit
Chicago
IOWA
Cleveland
New York
N.J.
PA.
Baltimore
M.D.
DEL.
IND.
OHIO
Indianapolis
Pittsburgh
Cincinnati
W.VA.
Washington (D.C.)
VA.
ILL.
MO.
St. Louis
KY.
TENN.
Knoxville
N.C.
Muskogee
Chattanooga
ARK.
S.C.
Birmingham
GA.
MISS.
ALA.
LA.
New Orleans
FLA.
Coal producing districts
Coal bearing lands of potential commercial value
Lignite

any other town in the United States: for not only is it within easy reach of the Connellsville coke, but it was likewise one of the great centres of the trade in petroleum. For several years also its iron, glass, and other industries dependent on fuel had the advantage of natural gas, which issues from the ground in the vicinity, and was conveyed to the city by pipes. With the increase in price this gas was mainly used for domestic purposes and now finds its greatest use in the localities where found. Pittsburgh produces about one-fourth of the pig-iron made in the United States, and carries on all branches of the iron and steel industry to a greater extent than any other city in the country. The chief supplies of ore to Pittsburgh are now brought from the Lake Superior region. Pittsburgh was an early witness of large-scale amalgamations. In 1900–01 numbers of the most important iron and steel-working companies were united in a great trust with a capital of above £230,000,000—the great United States Steel Corporation. There were no fewer than thirty-eight plants belonging to this trust at different points on twenty-six miles of navigable water (the Ohio, Allegheny, Monongahela, and Youghiogheny) with Pittsburgh as a centre, and there were numerous other plants belonging to it on the borders of the states of Pennsylvania, New York, and Ohio between Pittsburgh and Lake Erie. The trust also owns vast coal-fields, including the Pocahontas coal-field, extensive deposits of ore in the iron ranges in the United States round Lake Superior, railways connecting these ranges with the lake, railways connecting establishments belonging to the trust in and round Chicago, and a railway connecting Pittsburgh with the lake-ports of Conneaut (Ohio) and Erie (New York). In the making of glass the employment of natural gas was as beneficial to the quality of the product as in the making of iron, and from the same cause, the absence of sulphur. At a trial of window-glass made from coal and from gas-fuel at Pittsburgh it was found that newspaper print could be read through eighteen sheets of gas-made glass placed behind one another, whereas nothing could be seen distinctly through six sheets of similar coal-made glass.

Next to Pennsylvania in the production of pig and rolled iron, and the larger iron manufactures, comes the Erie lakeside region of Ohio and then the Chicago-Gary lakeside regions of Illinois and Indiana, which are readily accessible to supplies of the Lake Superior ores, and have coal-fields within easy reach to the south. In the south-east the iron industry of the United States has developed rapidly on the coal-field of northern Alabama, which is situated in the midst of large supplies of iron ore suitable for the manufacture especially of foundry iron. This ore lies in limestone valleys which supply abundance of flux. From the combination of these advantages, together with that of cheaper labour than in other iron-working districts of the country, this is the district in which pig and cast iron

can probably be produced cheapest, and hence has grown here with rapid strides the town of Birmingham, with similar associations to those of the Birmingham of older and wider fame. In the same state are Sheffield, Bessemer, Anniston, and other towns engaged in the same industry. Anniston has the most extensive manufacture of cast-iron pipes in the United States. It is this district that might be expected to compete most keenly in foreign countries with the iron-producing districts of Great Britain ; but it is an important element in the comparison, that its centre lies, roughly speaking, about four hundred miles by rail from the seaport of New Orleans, about two hundred and sixty from that of Pensacola, on the Gulf of Mexico. An extensive plant for the carrying out of all kinds of iron and steel industries was erected by the United States Steel Corporation at Duluth, one of the chief shipping points of the Mesabi ores, but it was not successful.

In New England, which in colonial days, along with other parts of the Atlantic coast, supplied pig and bar iron to the mother-country, the making of pig-iron is almost extinct, but some of the cities still retain a reputation for their manufacture of iron and steel articles of high quality, such as tools and cutlery. It is in the Atlantic States that most of the imported iron ore (nearly all ore of high quality, from Spain, Algeria, and Cuba) is utilised. The principal steel-working establishments on this coast are at Sparrow Point on Chesapeake Bay, nine miles from Baltimore, and at South Bethlehem on the Lehigh River in Pennsylvania.

Notwithstanding the disadvantages of the United States for carrying on an export trade in iron and iron products (except with Canada, and to a smaller degree with other parts of America), the rapid expansion of the iron industry is easy to understand in view of the great development of the American railway system, then the extensive use of machinery of all kinds, and later the enormous use of structural steel in building 'sky-scrapers.' And the fact must not be omitted that the United States carry on a widespread export in certain finished articles containing iron, such as automobiles, agricultural implements, sewing machines, typewriters, steel bridges, machinery, locomotives, &c. In the manufacture of all these articles the iron and steel manufactures have the advantage from one cause or another of an enormous home market, favouring production on a large scale and by the most economic methods. In shipbuilding, in which the Americans have not the same advantage, the fortunes of industry have varied. In 1900 only one steel steamship was built in the United States for the foreign trade. During the Great War American shipbuilding came to the front, but the tonnage built in 1920, 2·7 million tons, showed a great decline on the figures of 1919 (4·7 million tons), while the output of British yards increased from 1·9 million tons in 1919 to 2·1 million tons in 1920. In the

home trade United States shippers have a monopoly, and this has now been extended to Puerto Rico, and till the time of the War ships not built in United States yards could not be included in the national register. Since 1920 there has been a rapid decline. In the year ending June 30, 1925, only 125,000 tons were built; in the year ending December 21, 1930, 232,000 tons.

The precious metals of the United States are chiefly produced among the mountains in the west; gold principally on the Californian side of the Sierra Nevada and in many of the Rocky Mountain States as well as in the Black Hills of South Dakota. The mining of gold has shown a marked increase in recent years. Silver is principally from the Rocky Mountains, in Utah, Colorado, Montana, and Nevada. For quicksilver see p. 256, and aluminium, p. 270.

Lime and building stone are too widely diffused for their occurrence to be particularised, and the petroleum production of the United States is treated elsewhere (see p. 249). Copper is produced largely in the peninsula of Keeweenaw, which juts north-eastwards into Lake Superior (Michigan), in the south-east of Arizona, and in Montana. In this last state the copper ore is almost entirely obtained from the small district containing the mining and smelting towns of Butte and Anaconda, where metallic copper of exceptional purity is produced by the electrolytic process, which yields at the same time considerable quantities of silver as well as gold. The chief lead-producing centre of the United States is now amongst the Ozark Mountains in Missouri. Lead is also mined in the Rocky Mountains (in Idaho, Montana, Utah, and Colorado). Among other important economic minerals of the United States may be mentioned the phosphate rock of South Carolina, Florida, and Tennessee, which forms a valuable manure. Natural gas occurs not only in the part of western Pennsylvania already referred to, but also in many other places; the areas of most abundant production being in Texas, California, Oklahoma, and Louisiana. As early as 1901 there were 21,848 miles of pipe for the supply of natural gas in the United States, and the quantity produced was estimated to be equivalent in the production of heat units to 8½ million tons of coal.

There is only one metal of importance in which the United States are almost entirely deficient, and that is tin. Hence the large import of tin and tin ores, and formerly of tin-plate; the latter being a much-needed commodity in consequence of the large employment of tin packing-cases for American products of agriculture. The heavy import duties on tin-plate first imposed by the McKinley tariff in 1890, aided by the increasing facilities for the production of iron, have at last succeeded in establishing a great tin-plate industry in the United States. The production of tin-plate in the

country increased from next to nothing in 1891 to upwards of 399,000 tons in 1901. Meanwhile, the import of this commodity, almost entirely from the United Kingdom, sank from about 325,000 tons to less than 53,000, and on the average of the three years before the War was less than 33,000.

With regard to the manufacturing industries of the United States in general, it is noteworthy, in the first place, that they were to a very large extent carried on with the aid of water-power. Later coal became more important and still remains the chief source of power, but hydro-electric power has now become very extensively used. The total amount of water-power theoretically available in the United States has been estimated at upwards of 54,000,000 horse-power on an average throughout the year, and of which 16,000,000 horse-power have been utilised. Among the manufacturing towns which have benefited by the presence of water-power (in some cases called into existence by its presence when that power was used direct for the operation of mills) may be mentioned Lowell, Fall River, and Waltham, in Massachusetts; Nashua, in New Hampshire; Paterson, in New Jersey; Dayton and Akron, in Ohio; and Troy, in New York; the last being one of a group of manufacturing towns (including West Troy, Lansingburg, and Cohoes) which have grown up round the falls that interrupt the navigation of the Hudson. In flour-milling water-power is used to a very large extent. The Falls of St. Anthony, on the Mississippi River, have been the chief means of making Minneapolis (Minnesota) one of the largest wheat-markets and probably the greatest flour-grinding centre in the world, though the industry has now grown far beyond the capacity of the falls as a source of power. Numerous flour-mills were driven by the Falls of the Genesee at Rochester (New York), by the Spokane Falls in the state of Washington, and the Falls of the Willamette above Oregon City, in Oregon. Now water-power is utilised essentially indirectly for the creation of electric energy. This power can be transmitted up to 300 miles from the centre of generation—hence the wide influence of the great Niagara works.

The association of water-power development with the creation and improvement of waterways has been mentioned elsewhere. Here may be mentioned an early instance of this kind on the Upper Mississippi at Keokuk, at the mouth of the Des Moines River, about midway between Chicago and Kansas City, where a dam was built across the river on a bed of smooth hard limestone. Above the dam a deep pool upwards of 40 miles in length and more than a mile wide is thus formed. For navigation a single lock available for vessels of much larger size than those formerly plying on this part of the river replaced the former canal of 11½ miles in length passing round the rapids above Keokuk. At the same time the dam allowed of the development of 300,000 horse-power in a region embracing

a population of over 300,000, within a radius of 200 miles. Much of the power is transmitted to St. Louis, 137 miles away.

The same general principles have been followed in the great modern developments. Thus the works in the Tennessee Valley under the Tennessee Valley Authority aim both at the improvement of the navigation of the Tennessee River (despite doubts as to the economic expediency of such work) and the provision of power. The great schemes such as Boulder Dam in the more arid west are primarily for irrigation, secondly, for power. Reference must also be made to the greatest of all such schemes—that of the Columbia River.

Reference has already been made to the fact that few great American towns have grown up on coal-fields (see p. 108). Most American towns have owed their origin to commercial advantages, and a very large number of them to those arising from their situation on waterways, and this is applicable even to those which have developed as manufacturing towns through the utilisation of water-power, for this advantage coincides in a great many instances with a situation at the head of river navigation. In the table on pp. 746–7, which includes all the towns in the United States having at the census of 1930 a population of at least 150,000, and certain of the older though now smaller towns of New England, the column giving the chief manufacturing industry must not be understood as indicating the basis of the town's prosperity. In many of them the chief industry is the work of distribution.

Chicago (Illinois), the largest inland town, is the lake-port for the maize-growing and hog-rearing region to the south-west, but is still more important as lying at the corner of Lake Michigan and a terminal point for all the railways serving the wheat-growing and cattle- and sheep-rearing region of the west and a terminal point for the steamer lines of the Great Lakes. Both circumstances have combined to make the town a great centre of attraction for railway traffic in other directions. It is significant that the site of Gary (Ind.), the iron and steel manufacturing town of the United States Steel Corporation, was selected at the extreme south of the same lake, the first point touched in coming from the south-east.

St. Louis (Missouri), situated a short distance below the confluence of the Missouri and the Mississippi, and till the last decade of the nineteenth century at the lowest place on which the latter river was crossed by a bridge, has long been the chief town on one of the great western high-roads. Minneapolis and St. Paul grew up later after wheat-growing became widespread in the north-west. The mills of Minneapolis have already been noticed. St. Paul arose as the head of continuous navigation on the Mississippi. Cincinnati (Ohio), situated at the north of the great northerly bend of the Ohio River, was the first of the great pork-packing towns. Favoured by

excellent water communications, both above and below, as well as by railways, its general business and importance have continued to grow. Other great railway centres are Indianapolis (Indiana); Milwaukee (Wisconsin), the second in importance of the ports on Lake Michigan and the former focus of German immigration; Omaha (Nebraska), on the Missouri, a little above the confluence of the Platte or Nebraska River, at the crossing-place of the great line

Town.	Population in Thousands.				Chief Manufacturing Industry.
	1880.	1900.	1920.	1930.	
Boston, Mass.	360	560	750	781	Clothing; sugar
Lowell, Mass.	60	95	110	100	Cottons
Worcester, Mass.	60	120	180	195	Iron wares; boots and shoes
Fall River, Mass.	50	125	120	115	Cottons
Lynn, Mass.	40	70	100	102	Boots and shoes
Springfield, Mass.	—	60	130	150	Meat packing; iron wares
Providence, R.I.	105	180	240	253	Worsteds; rubber goods
Hartford, Conn.	40	80	140	164	Iron wares; small arms
New Haven, Conn.	65	110	160	163	Hardware
New York, N.Y.	1,200	3,440	5,600	6,930	Clothing
Jersey City, N.J.[1]	120	200	300	317	Sugar; tobacco
Newark, N.J.[1]	140	250	415	442	Leather
Paterson, N.J.[1]	50	105	135	139	Silk
Albany, N.Y.	90	95	115	127	Metal wares; textiles
Syracuse, N.Y.	50	110	170	209	Clothing
Buffalo, N.Y.	155	350	510	573	Meat packing; iron and steel
Rochester, N.Y.	90	160	300	328	Clothing, boots and shoes
Philadelphia, Pa.	850	1,300	1,800	1,951	Sugar; leather
Reading, Pa.	45	80	110	111	Steel
Scranton, Pa.	45	102	140	143	Silks
Pittsburgh, Pa.	240	450	590	670	Steel; glass
Akron, O.	—	45	210	255	Rubber tyres
Cleveland, O.	160	380	800	900	Iron and steel
Toledo, O.	50	130	240	291	Foundry work
Columbus, O.	50	125	240	291	Foundry work
Dayton, O.	40	85	150	201	Cash registers
Cincinnati, O.	255	325	400	451	Vehicles; harness
Youngtown, O.	—	—	—	170	—
Louisville, Ky.	125	205	245	308	Tobacco
Detroit, Mich.	115	285	1,000	1,569	Motor cars
Grand Rapids, Mich.	32	90	140	169	Saw-milling; furniture
Flint, Mich.	—	—	—	156	—
Indianapolis, Ind.	75	170	315	364	Meat packing
Chicago, Ill.	500	1,700	2,700	3,376	Meat packing
Milwaukee, Wis.	115	285	460	578	Malt liquors
Minneapolis, Minn.	47	205	380	464	Flour milling
St. Paul, Minn.	41	165	235	272	Fur goods; publishing

[1] All these towns are in the immediate neighbourhood of New York Harbour. New York now includes Brooklyn on Long Island.

Town.	Population in Thousands.				Chief Manufacturing Industry.
	1880.	1900.	1920.	1930.	
St. Louis, Mo.	350	575	770	822	Tobacco ; malt liquors
Kansas City, Mo.	55	165	325	400	Various
Omaha, Neb.	30	105	190	214	Brewing ; distilling
Baltimore, Md.	330	510	735	805	Canning ; clothing
Washington, D.C.	180	280	440	487	—
Richmond, Va.	65	85	170	183	Tobacco
Atlanta, Ga.	37	90	200	270	Cottons
New Orleans, Louis	215	290	390	459	Sugar
Birmingham, Ala.	—	40	180	260	Iron and steel
Memphis, Tenn.	35	100	160	253	Cotton-seed products
Nashville, Tenn.	—	—	—	154	—
San Antonio, Tex.	—	55	160	232	Trade centre
Dallas, Tex.	—	45	160	260	Saddlery
Houston, Tex.	—	—	—	292	—
Fort Worth, Tex.	—	—	—	164	—
Denver, Col.	37	140	260	288	Lead smelting and refining
Seattle, Wash.	—	80	315	366	Flour milling
Portland, Or.	—	90	260	302	Wood
San Francisco, Cal.	235	345	510	634	Sugar
Oakland, Cal.	—	70	215	284	—
Los Angeles, Cal.	—	100	580	1,238	Fruit packing ; motion pictures
Oklahoma City, Ok.	—	—	—	185	—

of railway from New York to San Francisco ; and Kansas City (Missouri) at the confluence of the Kansas River with the Missouri.

As may be seen from the table opposite, the towns most rapidly increasing in population in the United States are situated principally in the west, and chiefly engaged in handling western products. The case of Chicago has long been known. Founded in 1834 it contained only a few huts. The site of Omaha was first marked out for settlement in 1854. Duluth in Minnesota, the Lake Superior terminus of the Northern Pacific Railroad, had in 1875 a population of 2,500. Being the lake-port for the United States portion of the Red River valley, its receipts of wheat are in excess of those of Chicago. It is likewise a place of shipment for some of the iron ores of north-eastern Minnesota, and it has also developed smelting works for the silver, copper, and lead ores of the region traversed by the railway above mentioned. Remark may also be made on the rapid growth of Detroit, Akron, and Dayton, whose leading industries may be taken as illustrations of the more or less arbitrary selection of particular sites for manufactures of a certain type spoken of on p. 107. It may be mentioned, however, that the leading Detroit industry came as a natural successor to the manufacture of wooden

vehicles favoured by the abundant supplies of timber and the favourable situation for distribution. It scarcely needs to be pointed out that the rubber tyre industry of Akron develops hand in hand with Detroit's automobile manufacture.

At the close of the nineteenth century the following were the ten leading **seaports** in order of importance as determined by the amount of tonnage entered and cleared in the foreign trade: New York, Boston, Philadelphia, New Orleans, Baltimore, Puget Sound, San Francisco, Galveston, Newport News, and Mobile. In respect of the amount of its foreign commerce New York is without a rival, for on the average of the years mentioned the tonnage entered from foreign countries at that port was 48 per cent. of the whole; that cleared for foreign countries rather more than 46 per cent. Although the opening of the Panama Canal in 1914 has led to a great growth in the trade of the Pacific ports, New York is still without a rival. Measured in terms of the total foreign trade the leading ports in 1931–35 were New York, New Orleans, Galveston, San Francisco, Philadelphia, Boston, Seattle, Los Angeles. New York still held over 40 per cent. of the trade.

The physical conditions present great difficulties in the way of providing commodious harbours at all the ports on the Gulf of Mexico. The hinterland of New Orleans is one of the largest in the country, and has been made much more valuable by the development of railways by means of which the great bulk of the traffic is now carried on. At this port, which now ranks next after New York among the ports of the United States, the difficulties referred to have been admirably surmounted. A channel of 36 feet in depth is maintained as high as New Orleans (and, indeed, as high as Baton Rouge, 25 miles up) from the south-west Pass. Five canals with a minimum depth of 5 feet connect it in different directions with the neighbouring lakes and bayous. There are huge grain elevators and cotton warehouses and the city is the largest market in the United States for gunny cloth, rice, bananas, cotton, and molasses, and has a great sugar-refining industry. The structure of the Appalachian system has facilitated the construction of railways connecting it with New York, but a much more important connection is established by the Central Illinois Railroad with Chicago, 912 miles distant, nearly due north. By this line there is a large trade from New Orleans in bananas and other imported fruit, as well as in garden produce grown in the neighbourhood of New Orleans in the early months of the year (from January onwards), and from July onwards the same kind of produce is carried the other way—from the northern states to New Orleans. Galveston has with difficulty been provided with a navigable channel across the bar. Having the advantage of being only 2,130 miles from San Francisco, as against 2,480 miles, the distance between that port and New Orleans, it has been made the principal Gulf port of the great

railway system of the Southern Pacific Railroad. Before the opening of the Panama Canal large quantities of Hawaiian sugar were conveyed from San Francisco to Galveston even for New York and other eastern seaports. The wharves at Mobile can be reached only by vessels drawing no more than 21 feet.

Among the minor seaports of the United States may be mentioned Newport (Rhode Island), Washington (D.C.), Richmond (Virginia), a great tobacco port, Wilmington (North Carolina), Pensacola (Florida), chiefly a timber port, Wilmington (southern California), Portland (Oregon), a great wheat port of rising importance; Tacoma (Washington), on Puget Sound, one of the termini of the Northern Pacific Railroad. Pensacola has one of the best harbours on the Gulf. Tampa, on the west coast of Florida, is a great seat of cigar factories and a place of export of rock phosphate. Key West on a small island at the southern end of Florida, which forms the southernmost of a chain of keys 140 miles long, and since January 1912 has been connected by rail with the mainland and is the starting-point of a train-ferry to Havana, is a first-class naval base and another important seat of tobacco manufactures. The fisheries and fishing-stations of the United States are treated of elsewhere (see p. 233).

The shipping at American seaports was formerly mainly under foreign flags, the United States flag being represented on the average of the five years 1881–85 by barely 20 per cent. of the whole. By far the largest share belonged to the British flag; those of Germany, Norway, and Italy then coming next after that of the United States itself. Formerly the chief reason of this inferiority of the native flag in foreign commerce was the fact that no vessel was allowed to be registered as belonging to a United States owner unless built in the United States. This disability was removed by an Act of Congress in August 1914, but the higher wages of American crews remains an obstacle to competition with other countries in the carrying trade to and from foreign countries. From Table I, under the heading Tonnage of Merchant Navies, in the Appendix, it will be seen that after 1860, not only the proportion of the merchant shipping of the United States to that of the United Kingdom declined, but that that merchant shipping declined absolutely. This was a natural consequence of the two changes which began to be rapid about that date—from wood to iron (afterwards steel) in shipbuilding, and from sail to steam. The first change deprived the United States of its special advantage in shipbuilding material, the second caused the cost of the service of the shipping to be much greater than before, relatively to the cost of ship-production, and so to make the highly paid American labour a hindrance in competition for the carrying trade. The percentage of the imports and exports of the United States carried in vessels registered in the country amounted in the year ending June 30, 1860, to 66·5; in

UNITED STATES [1]

GENERAL IMPORTS,[2] EXCLUDING BULLION AND SPECIE.

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1870–5[3]	'80–85	'85–90	'90–95	'95–00	1900–05	'05–10	'11–13	'25–29	'70–75[3]	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'11–13	'25–29
1. Sugar	*18·20*[4]	18·31	16·99	—	18·50	16·13	19·23	21·95	47·55[10]	*15·1*[4]	13·2	11·4	—	12·0	8·0	6·9	6·1	5·4
2. Hides and skins	3·34	5·24	5·08	5·25	8·14	11·71	17·19	21·42	21·52	2·8	3·7	3·4	3·2	5·3	5·8	6·1	6·0	2·8
3. Chemicals	—	—	8·28	9·47	9·63	12·74	16·73	17·93	11·29	—	—	5·5	5·8	6·2	6·3	6·0	5·0	1·3
4. Coffee	9·11	10·05	13·02	20·46	14·13	14·47	15·31	23·08	61·25	7·5	7·2	8·7	12·5	9·1	7·1	5·5	6·5	7·0
5. Raw silk[5]	*1·09*	*2·61*	4·23	4·70	6·48	9·58	14·04	16·80	83·12	0·9	1·8	2·8	2·9	4·2	4·7	5·0	4·7	9·4
6. Cottons	6·72	6·61	6·01	6·13	6·98	9·82	13·90	13·83	13·12	5·6	4·8	4·0	3·7	4·5	4·8	5·0	3·9	1·5
7. Rubber	1·03	2·65	2·87	3·73	5·16	7·39	12·98	19·73	73·63	0·8	1·9	1·9	2·3	3·3	3·6	4·6	5·5	8·4
8. Flax, jute, hemp, etc., manufrs.	—	4·86	5·03	5·17	5·76	7·98	11·68	14·26	31·82	—	3·5	3·4	3·2	3·7	3·9	4·2	4·0	3·6
9. Wood & manufrs.	—	—	3·04	4·12	3·75	5·39	9·21	11·82	22·24	—	—	2·0	2·5	2·4	2·7	3·3	3·3	2·5
10. Jewellery	—	—	2·40	2·34	2·44	6·12	7·78	9·67	15·62[11]	—	—	1·6	1·4	1·6	3·0	2·8	2·7	1·8
11. Flax, jute, hemp, etc., raw	1·21	2·07	3·42	3·63	3·56	6·87	7·47	8·74	—	1·0	1·5	2·3	2·2	2·3	3·4	2·7	2·4	—
12. Fruit and nuts	2·28	3·61	4·08	4·44	3·68	5·80	7·11	9·42	18·02	1·9	2·6	2·7	2·7	2·4	2·4	2·5	2·6	2·0
13. Silks	6·10	7·16	6·94	6·83	5·47	6·69	7·03	5·80	8·24	5·1	5·1	4·6	4·2	3·5	3·3	2·5	1·6	0·9
14. Tin	—	1·03	1·48	1·60	2·21	4·49	6·30	9·77	19·78	2·6	0·7	1·0	1·0	1·4	2·2	2·2	2·7	2·2
Tinplate	—	3·47	3·99	3·74	1·06	0·88	0·83	0·19	—		2·5	2·7	2·3	0·7	0·4	0·3	0·1	—
15. Iron and steel and manufactures	*9·62*[6]	7·40	5·17	2·99	2·55	5·26	5·82	6·19	9·05	8·0[6]	5·3	3·5	1·8	1·7	2·6	2·1	1·7	1·0
16. Woollens	9·95	7·91	10·13	7·11	6·14	3·63	4·43	3·43	12·62	8·3	5·7	6·8	4·3	4·0	1·8	1·6	1·0	1·4
Average total value	120·4	139·0	149·4	163·6	154·5	202·5	280·2	357·2	879·73									

UNITED STATES[1]

SPECIAL EXPORTS,[7] EXCLUDING BULLION AND SPECIE.

Principal Articles.	Average Value in Millions Sterling.									Percentages of Total Value.								
	1870–5[3]	'80–85	'85–90	'90–95	'95–00	1900–05	'05–10	'11–13	'25–29	'70–75[3]	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'11–13	'25–29[9]
1. Raw cotton	41·12	45·57	46·79	48·07	45·95	69·64	91·16	119·14	181·09	39·2	28·2	31·0	26·3	19·4	23·4	25·0	25·0	17·9
2. Wheat and flour	12·82	32·83	22·15	30·67	30·87	27·30	24·54	23·89	46·58	12·2	20·2	14·7	16·8	13·0	9·2	6·7	5·0	4·6
Flour	*3·51*	*9·98*	*10·31*	*13·60*	*13·25*	*13·25*	*11·84*	*11·04*	*16·83*	*3·3*	*6·1*	*6·8*	*7·5*	*5·6*	*4·5*	*3·2*	*2·3*	*1·7*
3. Machinery, including agricultural	1·66	2·68	2·62	4·27	10·69	15·64	22·41	32·24	95·42	1·6	1·7	1·7	2·3	4·5	5·3	6·1	6·8	9·5
4. Iron and steel	1·15	2·01	1·99	2·86	8·33	12·15	18·63	33·13	51·70	1·1	1·2	1·3	1·6	3·5	4·1	5·1	6·9	5·1
5. Copper	—	—	0·52	2·03	7·11	10·60	18·01	25·31	31·77	—	—	0·3	1·1	3·0	3·6	4·9	5·3	3·1
6. Wood & manufrs.	3·46	4·79	5·35	5·56	8·40	11·72	15·86	21·99	32·14	3·3	2·9	3·5	3·0	3·5	3·9	4·3	4·6	3·2
7. Illuminating oil[8]	*6·73*	*9·01*	*9·02*	*8·42*	9·88	11·08	13·13	13·55	93·12	*6·4*	*5·5*	*6·0*	*4·6*	4·2	3·7	3·6	2·8	9·2
8. Lard	3·85	5·78	5·28	7·47	7·77	10·14	11·18	11·62	35·18 (8 and 9)	3·7	3·5	3·5	4·1	3·3	3·4	3·1	2·4	3·5 (8, 9 and 10)
9. Bacon and hams	6·34	9·28	7·45	9·81	11·81	10·94	10·10	10·10		6·0	5·7	4·9	5·4	5·0	3·7	2·8	2·1	
10. Leather & manfrs.	0·96	1·79	2·16	2·80	4·64	6·64	9·27	12·60	11·87	0·9	1·1	1·4	1·5	2·0	2·2	2·5	2·6	
11. Maize	4·31	6·79	5·84	5·36	13·35	9·03	7·95	5·90	—	4·1	4·2	3·9	2·9	5·6	3·0	2·2	1·2	1·2
12. Coal	—	0·85	1·19	2·09	2·77	5·05	7·51	12·24	21·36	—	0·5	0·8	1·1	1·2	1·7	2·1	2·6	2·1
13. Cottons	0·53	2·64	2·59	2·78	4·27	6·53	7·32	10·67	28·05	0·5	1·6	1·7	1·5	1·8	2·2	2·0	2·2	2·8
14. Leaf tobacco	4·11	4·04	4·80	4·77	5·26	6·23	6·91	9·86	30·13	3·9	2·5	3·2	2·6	2·2	2·1	1·9	2·1	3·0
Average total value	105·0	161·4	151·2	182·6	236·7	297·3	364·8	477·0	1009·35									

[1] Year ends June 30 until 1918, after which the calendar year is the basis of annual statistics. Exchange for 1925–29, calculated on a yearly average at 4·85 dollars to the £.
[2] Actual market values in country whence imported.
[3] Imports 1870–75, exports 1873.
[4] Including molasses.
[5] Including waste and cocoons from 1885–90; value in that period, £150,000.
[6] Excluding machinery; value 1875–80, £150,000 (0·2 per cent.).
[7] Market values at time and place of shipment.
[8] 'Refined mineral oil' 1870–95 and 1925–29.
[9] Percentages based on a total for 'general exports'—viz., £1,028·99 (in millions sterling).
[10] Canc.
[11] Precious stones.

1870 to 35·6 ; in 1880 to 17·4 ; in 1900 to 9·3 ; in 1914 to 9·7 ; but in the year ending June 30, 1918, to 21·9 ; and in that ending December 31, 1919, to 36·4 per cent. These figures include the

UNITED STATES

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES).

From	Percentages of Total Value.								
	'70–75	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'10–14	'25–29
1. United Kingdom	36·1	25·7	24·0	20·4	19·6	17·3	16·7	16·3	8·6
2. Germany	7·5	8·8	11·4	10·9	12·3	11·3	11·2	9·9	4·9
3. France	7·5	11·5	9·8	8·4	8·7	8·6	8·6	7·2	3·8
4. Cuba	12·2	8·9	7·1	8·8	3·5	6·3	7·2	7·5	5·5
5. Brazil	6·4	7·2	7·5	11·1	8·6	8·1	6·8	6·3	5·0
6. British North America	5·9	6·3	5·6	4·6	5·0	5·4	5·9	7·6	11·3
7. British East Indies	2·5	2·8	2·7	2·8	3·9	5·1	5·2	5·7	3·4
8. Japan	1·2	2·0	2·5	2·9	3·6	4·3	4·9	5·4	9·5
9. Mexico	—	1·3	2·4	3·4	2·9	4·1	3·9	4·4	3·4
10. Italy	1·4	2·0	2·6	2·8	3·1	3·4	3·5	3·0	2·5
11. China and Hong Kong	3·7	3·1	2·6	2·6	3·1	2·6	2·4	2·2	3·6
12. Belgium	0·9	2·3	1·3	1·3	1·6	2·1	2·2	2·2	1·7
13. Netherlands	—	1·1	1·6	1·7	1·9	2·1	2·0	2·1	2·1
18. Australasia	0·4	0·5	0·7	0·8	0·8	0·7	1·2	0·9	1·0
20. Brit. W. Indies and Guiana	1·2	1·8	1·3	2·3	2·2	1·5	0·9	0·8	—
Hawaii	0·2	1·1	1·6	1·3	2·2	—	—	—	—

To	Percentages of Total Value.								
	'70–75	'80–85	'85–90	'90–95	'95–00	'00–05	'05–10	'10–14	'25–29
1. United Kingdom	53·6	53·0	52·1	49·3	43·1	38·3	31·5	25·9	18·3
2. Germany	8·9	7·9	9·0	10·5	12·5	13·4	14·2	12·6	8·8
3. British North America	6·3	5·3	4·9	5·1	6·4	8·1	9·7	15·0	16·3
4. France	6·0	7·6	6·3	6·9	5·9	5·3	6·2	6·6	5·1
5. Netherlands	—	2·3	2·4	4·1	5·6	5·3	5·5	4·9	2·8
6. Mexico	—	1·4	1·3	1·7	2·1	2·9	3·2	2·1	2·6
7. Italy	1·2	1·2	1·7	1·7	2·1	2·4	3·1	3·5	3·3
8. Belgium	2·6	3·5	3·4	3·5	3·5	3·1	2·7	2·3	2·3
9. Cuba	2·8	1·5	1·5	2·0	1·2	1·8	2·7	3·0	2·5
10. Argentina	0·4	0·5	0·9	0·4	0·7	1·0	1·9	2·0	3·4
11. Japan	0·2	0·3	0·6	0·5	1·5	1·9	1·9	2·3	5·2
12. China and Hong Kong	0·5	1·0	1·2	1·1	1·6	2·3	1·9	1·4	2·2
13. Australasia	0·6	1·2	1·5	1·1	1·6	2·0	1·8	2·3	3·1
17. Brazil	1·2	1·1	1·2	1·6	1·1	0·8	1·1	1·5	1·9
19. Brit. W. Indies and Guiana	1·6	1·3	1·2	1·2	1·0	0·9	0·8	0·6	—
22. British East Indies	0·1	0·4	0·6	0·4	0·4	0·4	0·5	0·7	1·0
Hawaii	0·1	0·4	0·5	0·4	0·6	—	—	—	—

shipping of the Great Lakes. The figure is now roughly one-third (33 per cent. in 1934). The total amount of shipping engaged in the foreign trade flying the American flag reached in the year ending June 30, 1914, less than 1·1 million gross tons ; in 1919, 6·67 million ; in 1925, 8·15 million ; in 1930, 6·30 million. By 1935

this figure had dropped to 4·59, but this excludes the 10 million tons engaging in coastal trade and fishing.

UNITED STATES

GENERAL IMPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35	—	—
Foodstuffs	*24·0*	*21·3*	*21·9*		
Coffee	6·9	7·0	8·4		
Cane sugar	*10·1*	5·1	6·8		
Nuts and fruit	2·0	2·1	2·9		
Raw materials	*44·5*	*47·6*	*36·1*		
Silk (raw)	9·3	9·2	6·9		
Rubber (crude)	4·8	7·1	3·6		
Wood pulp	—	2·2	3·5		
Tin	—	2·2	2·5		
Hides and skins (raw)	2·1	2·9	2·1		
Firs, and manufactures of	2·2	2·8	2·0		
Woods, and manufrs. of	3·1	2·4	1·9		
Copper (unmanufactured)	—	2·7	1·7		
Petroleum	2·0	3·3	1·7		
Manufactures	*21·5*	*23·1*	*21·4*		
Printing paper	2·8	3·4	5·1		
Jute, and manufactures of.	—	2·3	2·0		
Gold and silver, specie and unmanufactured	*9·8*	*7·5*	*18·8*		
Total value in 1,000 million $	*4·0*	*4·0*	*1·7*		
Countries:					
Canada	11·1	11·7	11·3		
Japan	9·4	9·4	8·7		
United Kingdom	10·2	8·0	6·9		
Brazil	5·0	4·9	5·5		
Philippines	2·7	2·9	5·3		
Germany	3·9	5·3	5·0		
Malaya	4·1	6·1	4·7		
Cuba	10·0	5·1	4·5		
France	4·1	3·8	3·4		
India	2·9	3·4	2·9		
China	3·3	3·5	2·7		
Italy	2·1	2·5	2·6		
Mexico	4·6	3·1	2·3		
Dutch East Indies	1·6	2·2	2·2		
Argentina	2·1	2·3	2·0		

Par rate of exchange £1 = $4·866.

Here it may be stated that this inferiority in the shipping of the United States is part of the explanation of the large excess of exports over imports, which the tables given on pages 750–751 show in the

periods before the War. The cost of transmarine carriage must be borne to a larger extent by the United States than by foreign

UNITED STATES

SPECIAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.	—	—
Foodstuffs	*19·8*	*14·6*	*10·6*		
Fruits and nuts	2·2	2·6	4·3		
Wheat and flour	7·3	4·9	2·0		
Lard and substitutes	—	2·1	1·6		
Raw materials	*45·1*	*39·2*	*37·7*		
Cotton (raw)	21·1	16·2	19·0		
Petroleum (refined)	8·7	10·0	9·0		
Tobacco (raw)	3·6	3·1	5·2		
Wood, and manufrs. of	3·2	3·2	2·8		
Coal	2·5	2·5	2·4		
Copper	3·4	3·0	1·7		
Manufactures	*31·3*	*39·5*	*29·5*		
Iron and steel	10·4	5·1	4·4		
Cars and parts	5·2	8·5	7·1		
Electric machy. & appar.	1·9	2·2	3·1		
Agricultural machy. and apparatus	—	2·4	1·2		
Other machy. & apparatus	—	6·1	6·0		
Cotton goods	3·0	2·6	2·3		
Gold and silver specie and unmanufactured	3·7	*5·5*	*22·1*		
Total value in 1,000 million $	*4·7*	*4·7*	*1·8*		
Countries:					
United Kingdom	21·4	17·6	18·5		
Canada	13·6	17·1	14·5		
Japan	5·5	5·1	8·4		
Germany	9·6	8·3	6·5		
France	6·1	5·2	5·9		
Italy	4·1	3·0	3·0		
China	2·4	2·3	3·1		
Netherlands	3·3	2·8	2·6		
Belgium	2·5	2·2	2·5		
Mexico	2·9	2·6	2·4		
Philippines	1·3	1·6	2·4		
Argentina	2·6	3·5	2·1		
Cuba	4·4	2·8	2·0		
Australia	2·7	2·9	1·8		

countries, and this extra cost is represented by the excess of exports. The position was, of course, completely changed by the War, which converted the United States from a debtor nation to the chief creditor nation.

The United States possesses the **outlying territories** of Alaska, the Hawaiian Archipelago, Puerto Rico, the Panama Canal zone, the Philippine Islands (but see p. 612), the Virgin Islands, and the small Pacific islands of Guam and Tutuila in the Samoan group. Most of these were acquired from Spain in 1898, and in the same year the Hawaiian Archipelago was acquired. The greater number of the Virgin Islands were purchased from Denmark in 1917. Alaska, Hawaii, and Puerto Rico are included within the customs territory of the United States. Alaska lies to the north-west of the Dominion of Canada, and was acquired from Russia by purchase in 1867. It has an area more than six times that of Great Britain, and is traversed by a magnificent river, the Yukon. It produces commercially furs, salmon, and minerals. Gold deposits occur at Nome on the north side of Norton Sound nearly opposite the mouth of the Yukon, on Douglas Island (the Treadwell Mine), opposite Juneau in 58° 15′ N. (where quartz-mining has long been carried on), and elsewhere. Copper (from Copper River and Prince William Sound) is now the chief general product. Coal is known to exist on several of the islands fringing the mainland to the south of the fifty-eighth parallel of latitude, but is little worked ; but in 1903 a report was issued on important seams of a hard bituminous coal discovered at a distance of from 12 to 25 miles inland from Controller Bay just north of the sixtieth parallel, and west of 144° W. Alaska has a large potential output of pulp-wood, and recent developments in the rearing of fur-bearing animals (Blue Fox, Reindeer and Seals) should be noted. The total population of the outlying territories in 1930 was above 14,000,000.

MEXICO [1]

South of the United States is Latin America, containing twen countries in which the dominant influence is Spanish, Portugues or that of some other European people, but in which the mass of the people except in the temperate south of South America ar partially or wholly American Indian in blood.

The first of these is Mexico, a land more than eight times as larg as Great Britain, nearly three times the area of Texas, tapering south wards from the boundary of the United States into the tropics, an then expanding again where it embraces the peninsula of Yucatan, as shown on the accompanying map, which also shows and names th several regions of which the country is made up. These regions are for the most part separated by mountain barriers and it is mainly the pre-eminent importance of one of the regions, the Central Plateau, which has caused the whole to form one political unit for hundreds of years, a unit physically separated from the United States by an area of desert or semi-desert, in the eastern part of which the Rio Grande forms a convenient line of demarcation.

The Central Plateau, the heart of Mexico, the favoured highland area about Mexico City, though only about one-sixth of the area of Mexico, contains more than half the population, and by far the larger proportion of the white population, mainly Spanish, many of them the descendants of those who, under Cortez, here overthrew the old Aztec Empire in 1519–21. It lies at the height of about 7,000 feet above sea-level, is bordered east and west by rugged mountains, and is made up of a number of basins separated by mountains of volcanic origin, including some cones towering to heights of eternal snow, and containing a few surviving lakes, notably in the great valley of Mexico. These basins enjoy a climate more truly temperate than that of most of the temperate zone. There is no hot summer or cold winter, but an average temperature of between 55° and 65° F. for every season of the year. Days are warm and nights cool ; the sun is hot at midday, and occasionally there are frosty nights. The rainfall, on the average about thirty inches per annum, occurring mostly between April and October, is sufficient for agriculture, though crops suffer in dry seasons.

[1] This section is a condensation of text written by R. S. Platt, Assistant Professor of Geography in the University of Chicago.

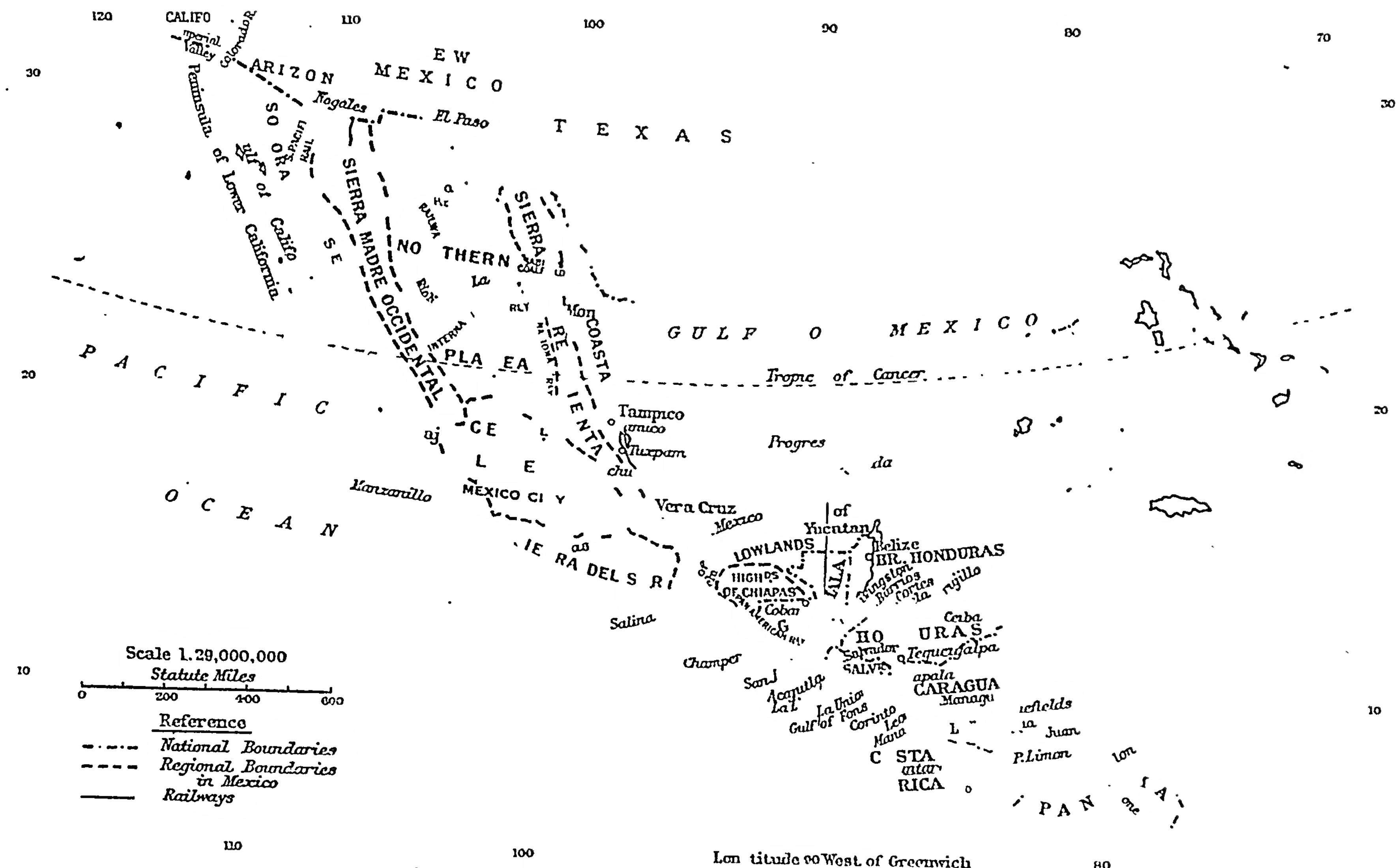
Maize, the principal crop, occupies as much land as all other crops together, a greater proportion of the crop land than in any other large country. Other conspicuous crops are wheat and barley, also for domestic supply, besides beans and potatoes for human food, and alfalfa or lucerne, and other crops as fodder for cattle, which are also fed on pasture-land. Irrigation is resorted to where streams fed by the heavier rains and melting snows of the encircling mountains reach the basins. Much of the pasture land is on the less fertile lower slopes of the mountains, where the soil is apt to be dry, and on these slopes also are grown the agaves, the most distinctive crop of the Plateau, drought-resisting plants native to Mexico, with long, sharp, fleshy leaves, of which the century plant is an example. Most of these are raised for their sap, which is used in the making of pulque, a favourite fermented beverage. A distilled beverage, mescal, is also made from the root. Part of the crop is used to yield the long, strong maguey fibre to make woven mats and other articles.

Mineral wealth, too, associated partly with the volcanic rocks, has long been important. The silver and gold mines of the Aztecs were the chief attraction for the Spanish conquerors, and Mexico still leads the world in the production of silver.

Manufactures date back to the bygone civilisation, but the old industries, the making of pottery, textiles, and other articles, have somewhat declined since the rise of factories financed by European capital. Besides having the advantages of local labour, a local market and water-power furnished by streams from the Sierra Madre Oriental, these are promoted by a high protective tariff. Cotton factories using raw material partly from northern Mexico and partly from the United States are the most important. Tobacco factories, flour mills, breweries, and other establishments supplying the domestic market and having the additional advantage of more or less raw material produced locally, are also to be noted.

Each basin has one of the important towns of the country for its centre, and naturally the most important of all, the city of Mexico, with a population of over a million, is the centre of the richest of all the basins, the valley of Mexico, This city is not only the political capital but also the financial, commercial, industrial, and cultural centre of the country. The resultant railway connections are shown on the map.

The Northern Plateau is a continuation of the Central Plateau, with similar land-forms and without any marked physical breach, but distinguished by its smaller rainfall and a consequent difference in vegetation and distribution of the population. Without irrigation crop cultivation is impossible, and cattle-rearing on large ranches, some of them hundreds of square miles in extent, is the prevailing economic feature. In the basins, dry bush and grassland



ARIZON
MEXICO
TEXAS
El Paso
Nogales
SIERRA MADRE OCCIDENTAL
GULF O MEXICO
Tropic of Cancer
PACIFIC OCEAN
Peninsula of Lower California
Tampico
Tuxpam
Vera Cruz
MEXICO CI Y
Manzanillo
Progres
Salina
LOWLANDS
HIGH OF CHIAPAS
Belize
BR. HONDURAS
Tegucigalpa
CARAGUA
Managua
C STA RICA
P.Limon
PAN
Scale 1.29,000,000
Statute Miles
0 200 400 600
Reference
National Boundaries
Regional Boundaries in Mexico
Railways
Lon titude 90 West of Greenwich

furnish the fodder, especially from June to October, when the rainfall is somewhat more plentiful. Each ranch or hacienda is like a feudal barony, the nucleus being a great house or village established where a reservoir of water can be formed. The owners are white families, often living in Mexico City or in Spain, the labourers Mestizos or Indians. Here fibre is obtained from several wild plants, chiefly two kinds of ixtle, and this region is also the source of guayule (a type of rubber). The basin known as La Laguna, at the intersection of the International and Central railways, is irrigated by the control of the floodwaters of the Rio Nazas, and in it is grown ninety per cent. of the Mexican cotton crop.

Mines are important in the Northern Plateau. The cities are mainly centres of mining areas producing, in addition to silver and gold, copper, lead, zinc, and coal. These latter industries are modern, the copper production in particular being an extension of the Arizona industry into Mexico. The only important coal-field, near the Rio Grande, does not produce enough for home consumption.

Sonora, in the north-west of the country, sinks down to low levels, and is, in the main, desert, especially where it approaches the frontier. Farther south, where higher mountains promote greater rainfall, more streams descend to allow of irrigation settlements. But the largest irrigation works are those of the Imperial Valley, partly in the United States, in the delta of the Colorado at the northern end of the Gulf of California. A railway running parallel to the east shore of the Gulf of California into the United States, and several small ports along the coast, furnish outlets for the mines on the mountain slopes as well as for the irrigation settlements.

The narrow, mountainous peninsula of Lower California is also desert for the most part, though there are a few patches of irrigated land. There are also a few mines, notably a large copper-mine on the east coast, and a little fishing.

The sierras bordering the plateaus east and west present some marked contrasts. The Sierra Madre Occidental being on the lee side with a reference to the prevailing rain-bearing winds, the trade-winds, has a scantier rainfall than the eastern range, though enough to maintain green pastures below and pine forests above. Its chief wealth is in its mines. It forms a marked barrier, an unbroken wall in which the valleys are mostly narrow gorges without utility as passes.

The Sierra Madre Oriental is less high and continuous, and has several lines of valleys through which run railways to the Gulf ports. The most important of these is that series followed by the railway from Mexico City to Vera Cruz. The way is steep, but the valleys are flat-floored and productive, the products changing in the

descent from grain to coffee and tobacco, and still lower to sugar-cane and tropical forests. On the middle slopes the temperature is always pleasantly warm, and the rainfall in many places averages 100 inches or more in a year. Here, also, manufactures are carried on. Orizaba is the leading centre of textile factories in Mexico.

At the foot of the Eastern Sierra is a coastal lowland, *tierra caliente*, hot country. Most of it is unimportant at present, but in it are three places or districts of outstanding importance: the port of Vera Cruz; the petroleum fields near Tampico; and the sisal district in Yucatan.

Vera Cruz is on a desolate shore, and has a poor natural harbour, but it is the terminus of the route from the Central Plateau, and has been converted into a first-class port, with ample equipment of modern type.

Indications of petroleum have been found in many parts of Mexico, but nearly all the production has been in the State of Vera Cruz, west and south of Tampico. Most of the petroleum is heavy and has an asphaltic base. The product of the fields on the northern coast of the Isthmus of Tehuantepec is light and has a paraffin base, but the amount is less than one per cent. of the total production. The wells of the Vera Cruz districts in general are not exceptionally deep and a fairly large proportion of them have been successful. They include some of the largest and most sustained gushers known, but the production of the whole dropped greatly after 1923. Their development has been in foreign hands, mainly American and British. Tampico, the chief town of the oilfields, is the largest lowland city of Mexico. Its harbour has been so improved as to allow of large vessels docking along the water front. A coastal lagoon with connecting canals provides a sheltered shallow waterway 85 miles southwards to Tuxpam, another oil port, where a submarine pipe-line conveys oil to tankers lying about a mile off-shore.

The other important lowland area is in the northern part of the Yucatan Peninsula. The rainfall here is scanty and the dryness is accentuated by surface conditions. The soil is underlain by a highly soluble limestone, in which sink holes are numerous, and there is no surface drainage. Maize and other supply crops can be raised, and in prehistoric times the Maya Indian civilisation flourished here. But the modern Indian inhabitants are unprogressive, and it is modern commerce and foreign capital that have brought prosperity to the district. Sisal fibre can be grown nowhere else over a large area with such favourable conditions and so accessible to the United States market. Everything except the port is here favourable to large scale operations. Railways radiating from Merida, supplemented by tramways running through the large plantations, bring the product to Progreso, but there, unfortunately, ships have to

anchor three miles from the shore. The southern part of the peninsula is the chief source of chicle, the basis of American chewing-gum, obtained by tapping the zapote-tree (*Achras Sapota*, Linn.). The production of rubber from the Castilloa, wild and planted, has greatly declined with the fall of rubber prices.

The narrow lowlands on the Pacific coast east and west of the Isthmus of Tehuantepec are similar to those on the Atlantic side, moist in some places, and dry in others, wooded, slightly developed. The isthmus itself is a low, hilly area.

Southern Mexico has, for the most part, a population out of the reach of railways. More people live in the highlands than in the lowlands. The Sierra del Sur is a highland region separated from the Central Plateau by the great gorge of the Rio Balsas. Round the head of the Balsas Valley a ridge allows of a railway from the Plateau entering the Sierra, but the region is so dissected that communities within it, mostly of Indians, are isolated from each other and contribute little or nothing to world trade. Indian languages and ways of living still persist.

The highlands of Chiapas are less dissected. There is a rather dry highland valley in which grain crops are raised and cattle and sheep pastured, and there are moist slopes below on which coffee is grown for export. The people are largely Indian and primitive in their mode of life. There is more trade with Guatemala than with Mexico, and the region may be considered the northernmost of the Central American highlands.

The exports of Mexico are made up of a few staple commodities produced in large quantities in special districts. Since pre-War days the greatest change that has taken place has been in the position of petroleum, which now furnishes most revenue to the Mexican government, and thus gives peculiar importance to foreign enterprise in a district of secondary importance from the view-point of the Mexican people. The widely distributed metal industries are not so largely under foreign control. The products are mostly exported in concentrated but unrefined forms to the United States. The imports are of miscellaneous merchandise, and are still very much as indicated in the table below showing the pre-War trade, except that foodstuffs now take a prominent place—partly in consequence of the growth of the petroleum industry. Besides the ports already mentioned, Puerto Mexico, the Atlantic, and Salina Cruz, the Pacific terminus of the Tehuantepec Railway, handle a good deal of traffic, though inevitably much less than before the opening of the Panama Canal. The Pacific coast generally has better harbours than the Atlantic, but suffers from the lack of tributary areas with convenient means of communication. Acapulco, at the foot of the Sierra del Sur, has the finest Mexican harbour, but insignificant commerce. Even Manzanillo, the only Pacific port having rail

MEXICO[1]

GENERAL IMPORTS,[2] INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling.			Percentages.		
	1900–05	1912	1929	1900–05	1912	1929
1. Machinery and engines	1·60	2·17	5·35	10·8	11·6	13·8
2. Cotton manufactures[3]	0·91	0·98	1·60	6·1	5·3	4·2
3. Chemicals and drugs	0·59	1·23	2·51	3·9	6·6	6·5
4. Iron and Steel	0·59	0·84	4·28	3·9	4·5	11·1
5. Railway materials and carriages	0·75	0·48	3·50[4]	5·0	2·6	9·1
6. Coal and coke	0·76	0·45	—	5·1	2·4	—
7. Wood for building	0·39	0·53	0·86	2·6	2·8	2·2
8. Woollen manufactures[3]	0·38	0·36	0·32	2·6	1·9	0·8
9. Paper, and manufactures of	0·42	0·43	1·16	2·8	2·3	3·0
10. Silks and half-silks[3]	0·31	0·38	1·35	2·1	2·0	3·5
11. Mineral oil	0·16	0·25	1·30	1·1	1·3	3·4
Average total value	14·87	18·65	38·61			

GENERAL EXPORTS,[5] INCLUDING BULLION AND SPECIE

Principal Articles.	1900–05	1912	1929	1900–05	1912	1929
1. Silver bullion and ore	5·34	9·35	9·48	31·9	30·4	15·9
2. Gold bullion and ore	0·97	4·06	—	5·8	13·2	—
3. Henequen, raw	2·58	3·09	3·26	15·6	10·0	5·5
4. Copper, unwrought, and ore	1·90	3·74	8·98	11·3	12·2	15·0
5. Coffee	0·82	1·15	3·25	4·9	3·8	5·4
6. Hides and skins, raw	0·60	—	—	3·6	—	—
7. Rubber	0·04	—	—	0·3	—	—
8. Lead	0·50	0·50	8·54	3·0	1·6	14·3
9. Ixtle	0·25	—	—	1·5	—	—
10. Chick peas	0·16	—	—	1·0	—	—
11. Cattle	—	—	0·70	2·5	—	1·2
12. Chicle gum	—	0·44	1·03	0·8	1·4	1·7
13. Vanilla	—	—	—	0·9	—	—
Average total value	16·67	30·78	59·66			

COUNTRIES OF ORIGIN AND DESTINATION (PERCENTAGES)

From	'95–00	'05–10	1912	'25–29	To	'95–00	'95–10	1912	'25–29
1. United States	49·7	59·8	53·9	55·5	1. United States	76·1	72·0	77·2	68·9
2. United Kingdom	17·7	11·5	11·8	7·3	2. Utd. Kingdom	12·2	12·2	10·4	7·9
3. Germany	10·6	10·8	13·2	8·0	3. Germany	3·3	6·7	5·5	5·9
4. France	12·2	8·1	8·6	5·0	4. France	3·2	4·1	2·4	3·0
5. Spain	5·0	3·3	3·2	1·9	5. Belgium	1·2	2·6	1·7	4·3
6. Belgium	1·2	1·3	1·8	1·1	6. Cuba	—	0·9	—	1·3
7. Italy	0·6	0·9	1·1	0·7	7. Spain	0·8	0·9	0·7	0·5
8. Austria-Hun.	0·5	0·6	1·1	—					
9. India	0·5	0·6	1·1	0·5					

[1] Up to 1918 figures refer to fiscal years ending June 30, but therefrom to calendar years. Exchange rate for 1929 is an approximate average calculated from weekly returns, viz. 9·90 pesos = £1 sterling. [2] From 1913 invoice values for both exports and imports.

[3] Including ready-made clothing.

[4] Vehicles only.

[5] 'Declared values' 1905–10, otherwise invoice values. Export of mineral oil 1929, valued 8·83 (£ millions), or 13·1 per cent. of total exports.

connection with the Plateau, draws very little except local trade. Mazatlan is the largest city and port of the Pacific coast, receiving commerce from a large part of the Sonoran desert by railway and by small boats plying in the Gulf of California, and forming a port of call for the larger vessels trading between Panama and San Francisco.

MEXICO

GENERAL IMPORTS

—	Percentages of Total Value.				
	1921.	1926–30.	1931.[1]	—	—
Foodstuffs	*15·8*	*15·2*	—		
Lard	3·3	4·3	4·7		
Cereals	3·1	3·4	1·6		
Raw materials	*13·2*	*12·8*	—		
Mineral oils	5·5	3·5	5·1		
Building timber	2·8	2·3	1·1		
Manufactures	*69·6*	*68·7*	—		
Machinery	11·2	13·5	17·8		
Vehicles and parts	6·4	7·8	7·7		
Chemicals and drugs	5·2	5·9	8·2		
Paper, and manufactures of	2·6	3·0	3·8		
Iron and steel	9·9	9·5	9·1		
Silk and art. silk manufrs.	2·6	3·4	3·4		
Cotton goods	8·4	7·0	1·8		
Bullion and specie	*0·5*	*2·2*	*4·7*		
Total value in million pesos	*321·0*	*344·0*	*216·0*		
Countries:			*1931–35*		
United States	74·7	68·5	63·3		
Germany	7·2	8·5	10·9		
United Kingdom	7·0	6·8	8·1		
France	5·0	5·0	5·3		
Spain	2·3	1·8	2·5		

[1] Par rate of exchange £1 = 9·76 Mexican dollars or pesos. Approximate rate 1935, £1 = $17·5.

The government of Mexico is nominally like that of the United States. In form it is a federal republic with a constitution providing for universal manhood suffrage, but the mere physical difficulties in the way of creating a population sufficiently educated to make such a constitution workable have prevented this from being a reality. Probably 75 per cent. of the population are illiterate. An effort to govern by the will of the ignorant, helpless masses means accordingly nothing better than anarchy, and Mexico has been peaceful and prosperous only under strong dictators. Meanwhile, other nations have a stake in Mexican peace and are exerting

a steadying influence. There are many problems to be solved, but the prospects are for gradual, probably irregular, improvement.

MEXICO

GENERAL EXPORTS

—	Percentages of Total Value.				
	1924.	1926–30.	1931–34.	—	—
Foodstuffs	*6·7*	*12·1*	—		
Coffee	2·5	5·1	5·2		
Tomatoes	—	2·8	2·9		
Raw materials	*72·8*	*71·8*	—		
Mineral oils	47·0	19·6	19·6		
Other minerals	1·1	3·5	—		
Lead	9·5	13·6	8·8		
Zinc	—	8·3	5·9		
Copper	0·9	10·3	5·4		
Agave fibres	3·4	5·0	4·5		
Cotton	2·7	2·8	0·6		
Silver bullion	*18·1*	*15·5*	*13·2*		
Total value in million pesos	*321·0*	*593·6*	*428·5*		
Countries:					
United States	83·0	64·8	57·8		
United Kingdom	5·6	9·0	13·7		
Germany	2·8	7·2	7·0		
British West Indies	—	3·1	3·8		
France	1·4	3·5	3·2		

Towns of Mexico, 1930

Mexico (Greater)	1,029,000	Puebla	123,000
Mexico City	961,000	Merida	110,000
Guadalajara	185,000	Leon	99,000
Monterey	137,000	San Luis Potosi	92,000

CENTRAL AMERICA

South-eastward from Mexico the continent tapers off still more in the narrowing isthmus of Central America, which has a total area less than a third of that of Mexico, and considerably less than that of Texas. There is less variety than in Mexico, and certain characteristics persist throughout. There is a backbone of highlands. The highest peaks are volcanic cones, a number of them active. Lava flows and ash deposits are widespread. Towards the Caribbean Sea the highlands are older mountains, deeply dissected, and worn-down hills. On the coast of this sea there are broader lowlands than on the Pacific—swamps and alluvial lands instead of mountains sloping to the sea.

The temperature of the lowlands is high all the year, with a greater range between day and night than between season and season. The average for every month is about 80° F., the result of a range from about 70° F. by night to 90° by day. At 3,000 feet altitude the temperature is very agreeable, averaging about 70° F. The rainfall varies greatly from place to place in accordance with the exposure and the topographic structure. As in Mexico, the trade winds are the chief rain-bearers, and on the Atlantic side, where there is direct exposure to those winds, there is no dry season and the rainfall averages above 100 inches. Lowlands and mountain slopes are clothed with tropical rain forest. On the Pacific coast and in the interior highlands the rainfall is considerably less; there is a dry season between December and April, when the trees in many places shed their leaves, and there is much scrubby and thorny vegetation. The racial elements are like those in Mexico, but with the addition of some English-speaking negroes on the Caribbean coast.

Almost throughout the territory there are similar resources, similar problems of development, similar people and common interests, yet the conditions are not favourable to political unity. There is no continuity of population, but rather a congeries of population groups each gathered round one chief nucleus and separated from its neighbours by miles of almost impassable country. Practically all travel, even between adjacent countries, is by sea. Moreover, these population islands lack the advantage

of true islands, that of being circumnavigable, so that travel from coast to coast of the same country is in some cases by a roundabout sea and land route. The great project for a pan-American motor-road to link the North and South American continents may greatly change the present position. Regular air routes already link all the important towns with Mexico, on the one hand, and South America on the other, and direct routes pass to Havana and Florida. Central America has been called a connecting link between North and South America ; but it is rather a barrier separating oceans. None of the isolated population groups is strong enough to control the others, with the result that the area is divided up into six independent republics—Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, besides a British colony, and the Panama Canal Zone, which is under the control of the United States.

Agriculture is the chief industry in Central America, although little more than 3 per cent. of the surface is cultivated. The more advanced Indian communities were agricultural before Spanish occupation, and still carry on the same methods in a large measure and cultivate the same crops. As in Mexico, maize occupies more land than any other crop. Sugar-cane, beans, and various starchy root crops are common.

In modern times certain commercial crops have become important, but the most important of all as an export commodity, coffee, occupies less than one per cent. of the surface, and the exacting requirements of this crop (*cf.* p. 188) limit it to certain districts, the best of which are plateaus or high basins mantled with volcanic ash. The high quality of the product causes it to be in great demand in continental Europe. The industry is a Central American one, but European and United States interests have a strong hold on it.

Bananas (see p. 205) are second among the exports of Central America, but the cultivation of this fruit as now carried on is of recent and foreign origin. It demanded, for its inception, large amounts of capital and a high degree of organisation. Until the present generation the Caribbean coast, where all the banana estates lie, was an uninhabited wilderness. The inhabitants of the temperate highlands of this region have never tried to subdue the dense, fever-ridden forests of the rainy lowlands. Individual enterprise is helpless in the face of such obstacles. In a banana district it has been necessary to build a network of railways radiating from a newly equipped port, to clear the forest, to plant and tend thousands of acres of bananas, to harvest the crop week by week in perfect condition on scheduled time, to be transported successively by man, mule, tramway, railway, and special refrigerating ocean liner to a United States or European port, and thence to be distributed by special railway cars. Thousands of negroes have been brought as

labourers from the West Indies, particularly Jamaica, and these have to be housed, supplied with their everyday needs, protected against disease, and in some cases governed and policed. English and not Spanish is the language of the districts. The United Fruit Company of the United States is the largest of these organisations.

Other crops are sugar-cane for the domestic market, cacao, and coconuts. Cacao is a commercial crop as yet small in amount, but promising. It has been replacing bananas in the older districts, where a banana blight, spreading uncontrollably, has infected the soil. Central America is a rather important source of supply of coconuts for the United States, being near enough to ship fresh nuts instead of the less bulky copra for oil only. Of the miles of coconut palms fringing the well-drained, well-watered beaches of the Caribbean coast, some belong to fruit companies and some to coastal Indian tribes.

Mineral industries have a minor place in Central America. There was mining of precious metals in prehistoric times, and the Spaniards were attracted to districts for mining rather than for agriculture, but large rich deposits are lacking, and small primitive workings are the rule.

Forest industries are already important and are becoming more so. Mahogany, Spanish cedar, rosewoods, and other less important cabinet woods as well as dye-woods (such as logwood) grow in various places on the Caribbean slope, and in some relatively moist forests on the Pacific slope, but the valuable trees are widely scattered among those of little value or for which there is at present little demand. There are unmixed stands of pine, suitable for structural timber, on sandy ridges of the Caribbean slope, but importation of timber from ports of the United States, where the forests are more easily worked than those of the isolated domestic reserves, still goes on. Dye-wood exploitation continues in dry as well as moist forests, although adversely affected by coal-tar dye competition. Rubber-gathering has declined. Chicle is gathered in forests adjacent to the Mexican chicle territory. Of the numerous other minor forest resources, some, such as oil nuts, are still potential, and some, such as Peruvian balsam, have been known and utilised for centuries.

Manufacturing is in a primitive stage. Household industries survive in communities which preserve an Indian culture, and are not commercialised. Pioneer factories of the sorts most closely tied to markets are appearing in the largest cities: such as manufactures of ice and bottled drinks. There are also factories of the kinds closely tied to raw material production, such as coffee-cleaning establishments, sugar mills, and ore-crushing plants, performing at least the preliminary operations in the preparation of raw materials for market.

The Political Units. Of the six republics Salvador is the small and has a coast-line along the Pacific only ; the other five have dir outlets to both Caribbean and Pacific.

Guatemala is the most populous and productive of the republi The bulk of its population is found on a healthy plateau adjace to a great coffee district on the Pacific slope. In the highlands ne the Caribbean is the smaller but more famous Cuban coffee distri and in the lowland valley of the Rio Motagua is a banana distri of the United Fruit Company. Guatemala city on the plateau h the largest town population in Central America (134,400 in 193 and was the capital, under Spanish rule, of the viceroyalty whi included all Central America. There was a large prehistoric India population in Guatemala, and the present population, mostl ignorant, submissive, and unprogressive, is more largely India (over 60 per cent. pure Indian) than in any other Central America country. Slavery has long been abolished, but the owners of lar estates still gain control over their labourers by advancing money t them and keeping them continually in debt. A large number of th coffee plantations are owned by Germans.

Salvador is the most densely populated of the republics, th boundaries being drawn close round one of the important nuclei o Central American population, in which is San Salvador witl 100,000 people. The inhabitants are largely mestizo, but they ar more enlightened and independent than those of Guatemala, and th cultivation of coffee (which furnishes 80 per cent. of the exports) an other crops is more intensive than is common in Central America

Honduras has a more scattered population than Salvador, an has no compact centre. It has only a few miles of coast on the Gul of Fonseca, and has no volcanic plateau area. In early Spanis days it was the chief gold and silver producing area of Centra America, and it now contains the largest silver-mine in that part o the world, controlled by an American company. Its capital, Tegucigalpa, is the only Central American capital not connected with the sea by railway, but it has an excellent automobile highway to the Pacific landing-place for the island port of Amapala. The scattered highland population of the interior makes strong centralised control and peaceful development difficult, but the Caribbean coast has the largest, most productive, and most rapidly expanding banana farms of Central America operated by two great companies which export especially to the United States, Germany, and Britain. Coconuts are also grown.

Nicaragua has a volcanic zone along the Pacific between the large lakes of Nicaragua and Managua and the coast, with fertile soil and moderate rainfall, a centre of population since prehistoric times. Managua, the capital, was almost totally destroyed by earthquake in 1931 but has been rebuilt. Notwithstanding the generally low

altitude, coffee is here grown as a money crop, though the climate is better adapted for sugar-cane, supply crops, and pasturage. A secondary coffee district lies in the more isolated and rugged interior north of the lakes. On the Caribbean coast banana-growing is carried on. The central highland chain is broken in Nicaragua. The lakes have their outlet to the Caribbean by the Rio San Juan, and are separated from the Pacific by a divide only 135 feet above sea-level. This was considered an alternative route for a ship canal, being lower than the Panama route, but no advantage has yet been taken of these facilities, and travel between the capital and the eastern part of the country is still by way of the Panama Canal. In this republic there is a rather turbulent mestizo population and misgovernment has retarded development. National demoralisation and bankruptcy led to interference by the United States in 1911, and that country is still in control. The United States secured an option on the canal route, but engineers reported that the cost would be $700,000,000 and no further action has been taken.

Costa Rica is the most attractive country of Central America. The heart of this country is a plateau or high basin bordered by volcanic mountains. Here, at the height of about 4,000 feet, is a great coffee district, and here live most of the people, mainly whites, unlike other groups in Central America. In the early days of Spanish occupation there were few Indians and few mines here, and the Spanish settlers had to work for themselves on their farms, with the result that now there is a plateau population with no landed aristocracy, no marked social stratification, but with education for all, and a generally diffused and effective interest in good government and peace. In the central basin lies the capital, San José, and there also are the principal cities almost within sight of one another. In the alluvial valleys of the Caribbean coast is one of the older and more important banana districts of the United Fruit Company, manned and worked as elsewhere. The export is largely through Port Limon, the chief port of the country.

Panama, a rugged and mostly infertile isthmus, belonged to Colombia till 1903, when it rebelled and was recognised as independent by the United States. The most favoured parts agriculturally are a banana district of the United Fruit Company, adjoining that of Costa Rica, and a district on the Pacific side in Chiriqui, near the western end of the country, where some recent settlers are raising cattle and cultivating sugar-cane and a little coffee. The Canal Zone, a strip ten miles wide across the country, is controlled by the United States. The chief cities of the republic, Panama (founded in 1508) and Colon, are enclaves excluded from the Zone by special agreement.

British Honduras occupies part of the Caribbean coast to the east of the main area of Guatemala. It is the smallest and the most

sparsely populated political division of Central America. It c into being as an aggregation of logging camps, under no polit jurisdiction, but within reach of the influence of Jamaica. became an organised British Crown Colony in 1884. There i mixture of Indian, negro, and white blood in the population. Bel the capital, is a river-mouth port of seventeen thousand people, has suffered great damage from hurricanes. Most of the interio inaccessible. The logging operations, which are still the domin

YEARLY RETURN OF SHIPPING AND NET TONNAGE THROU THE PANAMA CANAL

TONNAGE IN THOUSANDS OF TONS (000 OMITTED)

Year.	Vessels.	Atlantic to Pacific Net Tonnage.	Pacific to Atlantic Net Tonnage.	Total. Canal Tonnage Net.	Total. Cargo Tons.
1915	1,072	1,852	1,920	3,772	4,926
1916	760	1,272	1,114	2,385	3,063
1917	1,806	2,825	2,992	5,818	7,083
1918	2,086	2,744	3,839	6,583	7,536
1919	2,028	2,676	3,447	6,122	6,923
1920	2,478	4,169	4,377	8,546	9,374
1921	2,783	—	—	11,436	10,707
1922	2,997	5,496	5,389	12,993	13,711
1923	5,037	7,086	12,482	24,737	25,161
1924	4,893	7,860	19,135	24,412	25,892
1925	4,774	7,560	16,141	22,958	23,701
1926	5,420	8,420	19,166	25,836	27,586
1927	5,475	8,406	20,697	—	29,103
1928	6,456	9,066	30,336	—	29,402
1929	6,413	10,166	21,284	—	31,450
1930	6,185	—	—	—	30,030
		Cargo Tons.	Cargo Tons.		
1931	5,370	6,671	18,395	—	25,065
1932	4,362	5,632	14,167	—	19,799
1933	4,162	4,507	13,654	—	18,161
1934	5,234	6,163	18,541	—	24,704
1935	5,180	7,530	17,780	—	25,310

Note.—Fiscal years from 1930 onwards.

Minimum depth of canal, 41 feet; minimum bottom width of channel, 300 feet. Length, 50 mile from deep water to deep water. Average duration of transit, 7–8 hours.

activity, extend back from the streams into the forests. Logwood was formerly the chief product, and is still important. Mahogany now holds first place. There are some agricultural settlers, and some export from a banana district, but the colony does not feed its population, and food is imported along with most other commodities needed by the people. As in other parts of the Caribbean coast, development, held back by forests and disease, is in a pioneer stage. The extent of the productive possibilities is hardly tested.

THE WEST INDIES

This group of islands has an aggregate area not much larger than that of Great Britain, with a population of about 12,000,000. The two largest islands, Cuba and Hispaniola have but a moderate

population but some of the smaller islands, such as Barbados, are very densely peopled. The larger islands in the west are known as the Greater Antilles ; the smaller islands in the east, as the Lesser Antilles.

The Bahamas are flat coral islands, the seas surrounding which produce sponges. There is an outer line of islands—Anguilla, Barbuda, Antigua and Barbados—which are all similar in general character. All the other islands are mountainous, and the mountains and higher parts of the surface generally are covered with dense forests, which yield cabinet- and dye-woods to commerce. The Lesser Antilles really represent the peaks of a largely submerged line of mountains and many of the islands are volcanic. Hurricanes sometimes render the navigation of both the Atlantic and the Caribbean Sea dangerous in the period from July to October, and especially in September, when the sea is at its hottest and the winds are very variable.

The population is almost entirely descended from natives of other continents, the aboriginal population having been nearly exterminated within a short period after the discovery of the group by Columbus. A very large proportion of the inhabitants are the descendants of negroes, originally slaves. East Indian and Chinese coolies were introduced as labourers after the liberation of the negroes, on account of the unwillingness of free negroes to work. The rapid increase of the negro population has, however, left little opportunity for immigrants except in Trinidad.

Political relations. The majority of the islands owe allegiance to European powers—Great Britain, France, the Netherlands—but the two largest islands as well as Puerto Rico and the small Virgin group are now in the possession or under the influence of the United States. Puerto Rico is so far incorporated with the United States as to have a representative in Congress and to be included in the customs territory of that country. Cuba and Haiti are republics under the protection of the United States, and since November 1916 the nominal republic of Santo Domingo has been under a United States military governor. The Virgin Islands, except the British islands in the group, were formally taken over by the United States by purchase from Denmark, on March 31, 1917.

Cuba with an area of 44,164 square miles and a population of over four million has a somewhat elevated interior, but the only important mountain range is that which rises from the south coast in the east, the Sierra Maestra. There is a considerable extent of coast swamps, but the greater part of the coast-line is formed by coral reefs, in which the action of small rivers has formed at intervals a number of excellent nearly land-locked harbours, the only drawback to which is that where towns exist beside them they are apt to be silted up with pestilential mud. Under Spanish rule sanitation

was wholly neglected, but matters were greatly improved in this respect during the military occupation by the United States in 1898–1902. Indeed, it is claimed that for the first time in the history of Havana yellow fever was not epidemic in 1901. The most populous part of this island is in the west, but over 3,000 miles of railway now connect all the chief towns, and the impressive 'Central Highway' traversing the island from end to end which was opened in 1931 is the nucleus of a fine road system. Havana, the capital of the island, is a striking city, situated on a fine bay, and has an excellent natural harbour. The chief plantation products of the island are sugar, tobacco, fruits, and coffee. Cuba is the second largest producer of sugar in the world. Valuable iron mines are worked in the Sierra Maestra at Juragua and other places between the excellent port of Santiago de Cuba and Guantanamo, and deposits of copper said to be of enormous value exist at Cobre to the west of Santiago. Manganese ore is mined at Oriente. Commerce generally is greatly stimulated by the reciprocity treaty with the United States.

Puerto Rico (the name was changed by Act of Congress from Porto Rico in 1932) was acquired by the United States from Spain in 1898. The island has an area of 3,435 square miles and a population (1930) of 1,544,000 (mainly of white origin). Sugar, tobacco, coffee, and fruits (oranges, pineapples and grapefruit) are the principal products of the island, and cattle-rearing is an important industry. The capital is San Juan on the north side, the chief commercial town on the south coast, Ponce.

The British West Indies. For purposes of administration the British West Indian islands are grouped into six colonies—Bahamas, Barbados, Jamaica, Trinidad and Tobago, Leeward Islands, Windward Islands. The total area is a little more than 12,000 square miles, the total population about 2,000,000.

The Bahamas lie mainly outside the tropics and are essentially coral islands. They enjoy a delightful, mild climate, but the coral soils are porous and dry and liable to be impregnated with salt. Thus they are sparsely inhabited and only locally can tomatoes, pineapples, and sisal hemp be grown. Nassau, on one of the smaller islands, is the chief town and has been developed as a popular resort for Americans.

Barbados is also a coral island, but with a soil rendered very fertile by an admixture of volcanic dust. It is only about the same size as the Isle of Wight (166 square miles) but has a population density of over 1,000 to the square mile. Three-quarters of the surface is cultivated and devoted almost entirely to sugar. The chief town and port, Bridgetown, is naturally on the western or leeward side of the island which is swept by the healthy trade winds. The people are almost entirely of negro descent.

Jamaica is the largest of the British islands with an area of 4.207 square miles and a population approaching a million. The main axis of the island runs east and west and the Blue Mountains rise to over 7,000 feet. Indeed, the whole island is mountainous and the trade winds, striking the north-east coast, cause a very heavy rainfall. There is thus a great contrast in vegetation and products between one side of the island and the other. Bananas, grown on the lower, wetter ground or where irrigated, supply over 40 per cent. of the exports and are marketed largely in Europe (Fyffes Bananas) in common with those from other parts of the West Indies and Central America, being transported by the Elders and Fyffes Line (controlled by the United Fruit Company). The Jamaica Producers' Association also handles a large proportion of the output. Sugar and rum are still important—the plantations are away from the areas of greatest rainfall—whilst fine coffee, spices (pimento and ginger), coconuts and copra, cocoa, grapefruit, and dye-woods are other products. The chief towns (also ports) are Kingston (on the south coast), Port Antonio, and Montego Bay. The growth of the fresh fruit trade dates from the eighties of last century and was stimulated by a bounty granted from 1900 to 1910 to the steamship company for maintaining a direct trade with the United Kingdom, the steamers being equipped with the special cooled chambers necessary. Port Antonio is only 1,500 miles from New York, compared with 4,350 miles from Liverpool, so there is a considerable trade with the north-eastern United States. The Turks and Caicos Islands, yielding salt, and the Cayman Islands (famous for turtles) are dependencies of Jamaica.

Trinidad and Tobago are two islands of which the former is considerably the larger and which lies opposite the mouths of the Orinoco. In the north of the island of Trinidad is a mountain range running from east to west and forming a continuation of the coastal range of the Venezuelan mainland. Indeed, channels only a few hundred yards wide separate the island from the mainland, so that Trinidad is essentially a South American island and lies nearer the equator than other West Indian islands. It enjoys a climate more nearly equatorial and has cocoa and copra as leading products with sugar from the drier side of the island. Trinidad has important oil-fields in the south and the well-known 'Pitch Lake' from which pitch was used by Drake for caulking his ships in the sixteenth century and which is still a source of asphalt for modern macadamised roads. The chief town and port is Port of Spain and nearby is the Imperial College of Tropical Agriculture—a training ground for the whole Empire. Port of Spain serves partly as an *entrepôt* port, and transhipment of goods from South America, Europe, and New York destined for the smaller West Indian islands takes place here.

The Leeward Islands comprise the sugar-growing coral island of Antigua (with its dependencies Barbuda and Redonda), and the mountainous islands of St. Kitt's (or St. Christopher) and Nevis—sugar and sea-island cotton islands, Montserrat (long-famed for its lime juice, now with an output of sea-island cotton), Dominica (too wet and hilly for sugar but famed for limes, coconuts, and cocoa), the British Virgin Islands and Anguilla (both rather barren and sparsely populated).

The Windward Islands comprise a southern group with St. Lucia (once French and with a fine harbour at Castries—producing sugar, lime juice, cocoa, and copra), St. Vincent (famous for its production of arrowroot), the Grenadines and Grenada (with an output of cocoa and spices, notably nutmegs and mace).

The colonies of the West Indies are small and efforts have been made for a closer union. Distance makes this difficult—it is 1,000 miles from Jamaica to Barbados—and there is an intense local patriotism in each of the islands as well as a remarkable loyalty to the British Crown. The islands are now linked with Canada by an excellent service of passenger steamers (Canadian National Steamships) subsidised by the Canadian Government, and Canada affords an important market for fruits and early vegetables. In some ways the islands are becoming tropical dependencies of Canada rather than, primarily, of Britain. The splendid climate encourages the tourist traffic and there are excellent hotels in Jamaica, Barbados, and Trinidad.

Other Islands. Guadeloupe and **Martinique**, with some smaller islands, and half of **St. Martin** belong to the French. The products are similar to those of the British islands. The three considerable islands of **Curaçao, Aruba,** and **Bonaire** (or Buen Ayre), off the north coast of Venezuela, together with two smaller islands, and half of St. Martin, among the British and Leeward Islands, belong to the Dutch. The importance to the United States of the acquisition of the Virgin group lies in the fact that the principal island, St. Thomas, has a fine harbour, with the port of St. Thomas (formerly Charlotte Amalie) lying on the direct route from the Atlantic end of the Panama Canal to Europe and having excellent coaling and oil-fuelling facilities. In former times this port, having been made by the Danes a free port more than a century ago, became the chief depot for the West Indian Islands and the east coast of South America; but this trade dwindled away when direct steamer routes were established in increasing numbers between West Indian and South American seaports and those of Europe and America. It is now, however, likely once more to become an important *entrepôt*. The production of sugar and vegetables, including tomatoes, is important, and the output of St. Croix rum, from the island of that name, has recommenced since the repeal of Prohibition. A tourist traffic is being encouraged.

SOUTH AMERICA

This, the smaller half of the New World, has at least four-fifths of its area within the tropics, and hence yields chiefly tropical products ; but here as elsewhere the temperate area, relatively to its extent, furnishes a greater abundance of commercial commodities, and it is in this part of the continent that the rate of increase in the production of such commodities, and the development of means of distribution for them has been most rapid, and European immigration most constant. Thus the most powerful South American country, Argentina, lies almost wholly in temperate latitudes.

The lofty chains of the Andes, on the west side of the continent, form an important climatic barrier. In the latitudes in which the trade winds prevail they arrest the moisture-laden winds from the Atlantic, draining the moisture out of winds that have already been partly drained in their course over the continent farther east. The western slopes of these mountains, on the other hand, receive in these latitudes no rain from the Atlantic, and as far as 33° S. little or none from the Pacific. On that side the tendency of the wind is to blow away from the land, and the rarefaction of the air on the narrow strip west of the Andes is not enough to counteract that tendency. There is also, flowing northwards along the west coast, the cold Humboldt or Peruvian current which is accompanied by much upwelling of cold bottom water. The air over this current is cold and, if moving towards the land, is not likely to deposit any moisture over the warmer land surface. Hence the absolute desert, frequently entirely rainless, is along the actual sea coast. The Andes also constitute a great obstacle to communication between the east and west coasts. More than one railway reaches a height of upwards of 14,000 feet before attaining the tablelands between the principal chains of the mountains.

Some of the mighty rivers to the east of the Andes form excellent waterways. The Orinoco, in the north of the continent, is navigable for steamers continuously for nearly a thousand miles. The Amazon is navigable without interruption to the base of the Andes, a distance of 2,600 miles from its mouth, and 50,000 miles of navigation are afforded by the main stream and its tributaries great and small; ocean liners regularly reach Manaos, 1,000 miles from the

mouth. Many of these tributaries, however, have their naviga course greatly obstructed by falls and rapids ; as, for example, t Xingu and Tapajos on the right bank, the upper Rio Negro on t left. The Madeira is continuously navigable for steamers to beyo $8\frac{1}{2}°$ S., but there then follows a series of falls and rapids extendi over a distance of two hundred miles, interrupting the communic tion between Bolivia and Brazil. Since 1912 a railway complet the communication between these two points. The Araguaya an Tocantins, which enter the Rio Pará (a southern arm of the Amazo in one stream, both have their navigation more or less obstructe in the same way—the Tocantins to such an extent that the larg boats which ascend the river from the town of Pará to about 13° S take about ten months in ascending, against two months in descend ing. Falls and rapids likewise beset the course of the Rio Sa Francisco, and those of all the other rivers of the mountainou part of eastern Brazil, including that of the middle Paraná. Th value of the navigation of the Amazon is diminished by the paucit of population and products in the region through which it flow and by the similarity of the products in nearly the whole of its navigable course. The sole important article of trade is rubber (see p. 207). The inland waterway which is of most importance and likely to remain most useful to commerce in the future is that from north to south formed by the upper Paraguay and the lower Paraná, a waterway which is uninterrupted from near the source of the former river, and which, like the Mississippi, brings hot and temperate climates into direct communication.

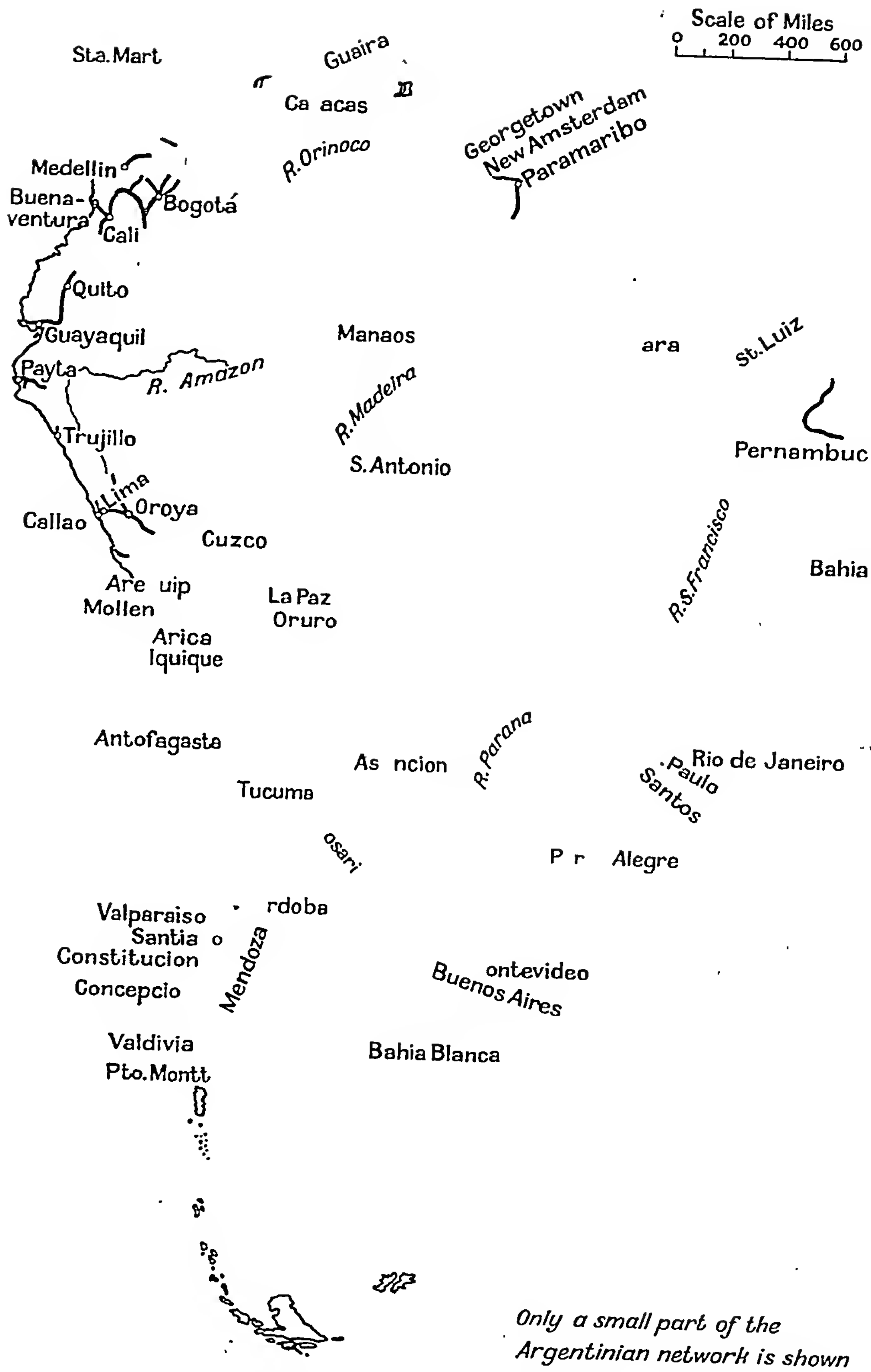
The population is still very scanty (except in a few pronounced areas such as the pampas of Argentina and the coffee lands of Brazil), probably not more than 65,000,000. Whites of pure blood form only from three to four-tenths of the whole, negroes about one-tenth, and the remainder are either native Indians or people of mixed race ; so that on the whole the Indian element still predominates. The white population in Brazil is of Portuguese origin, and Portuguese is there the official language ; but elsewhere, except in Guiana, the whites are mainly of Spanish descent, and Spanish is the official language.

The division of languages in South America is mainly the result of the award made in 1494 by a commission appointed by Pope Alexander VI., which met at Tordesillas, near Valladolid. That commission assigned all newly discovered regions not already in the possession of Christians to Spain and Portugal, Spain to have all those to the west, Portugal all those to the east of the meridian lying 370 leagues to the west of the Cape Verde Islands. In virtue of this award Portugal claimed the coast of Brazil, when a Portuguese navigator, Cabral, touched on a portion of that coast in 1500. The remainder of South America was claimed by Spain. Nevertheless,

Dutch, English, and French settlements were made on the coast of Guiana early in the seventeenth century, but the English have been in continuous possession of British Guiana only since 1803, when it was taken from the Dutch during the wars of the Napoleonic period.

SOUTH AMERICAN STATES

BRAZIL, formerly an empire, was declared a republic after a revolution in 1889. In size it is the rival of the United States and Canada. The limited area turned to account for **agriculture** is roughly indicated on the accompanying railway map, on which the names of the chief products are likewise inserted. Even the area which travellers deem it possible to bring under cultivation at some future time is but a small fraction of the whole. The equatorial valley of the Amazon is filled with dense swampy forests. Among them, however, suitable sites were found for the establishment of rubber plantations, but the industry has met with but limited success. Close to the coast, that trends from Cape St. Roque in a south-easterly direction, stretch ranges of mountains which cut off the Atlantic moisture from the region behind. This region is made up mainly of low tablelands (*campos*) with a sterile soil. North of about 20° S., that is, throughout the broader part of the country south of the forests, these *campos* are considered fit for nothing but pasture. There remains nevertheless an area in the south—small, indeed, compared with the extent of the empire, but yet between four and five times the size of Great Britain—in which there are many fertile districts still unsettled, and a considerable extent of these in latitudes fit for European settlers. For long the practice of slavery deterred free immigrants from settling in those provinces in which the institution was most firmly established (those growing tropical products), but from 1871 it was in process of abolition, and it was entirely abolished in 1888. Great efforts were then made by the Brazilian government to attract **immigrants** to those districts in which a substitute for slave-labour was most needed. Immigrants, chiefly Italian and Portuguese, arrived in thousands, the average for many years preceding the Great War exceeding 100,000 annually. In the southernmost provinces, where slavery was never very general, German and Italian colonies had existed for many years. Taking the country as a whole between 1820 and 1930 over $4\frac{1}{2}$ million immigrants arrived in Brazil—33 per cent. Italians, 28 per cent. Portuguese, 13 per cent. Spaniards, 4 per cent. Germans together with large numbers of Austrians and Russians. There are now considerable Japanese colonies. Agriculture is still the mainstay of Brazilian prosperity—the great crop being coffee of which the country produces over 70 per cent. of the world's total. Over-production of coffee has directed attention to other



THE RAILWAYS OF SOUTH AMERICA

crops and Brazil is now second to the United States in the export of oranges. Cotton is also important and animal products in the south (adjoining the grasslands of Uruguay). In recent years the working of minerals and the carrying on of manufactures have been growing in importance. The old gold-mines of Ouro Preto and the diamonds of Diamantina in the state of Minas Geraes are no longer of any

BRAZIL

GENERAL IMPORTS

—	Percentages of Total Value.					
	1913.	1923.	1926–30.	1931–35.	—	—
Foodstuffs :						
Wheat . . .	8·1	9·9	9·5	12·9		
Raw materials :						
Mineral oils . .	—	—	6·8	8·4		
Coal, coke, briquettes .	6·9	6·3	4·6	4·6		
Iron and steel (raw) .	—	[1]	1·5	1·7		
Manufactures :						
Machinery . . .	10·6	11·9	11·6	13·5		
Iron and steel manufrs.	12·0	8·5	8·0	7·5		
Chemicals and drugs .	2·1	2·6	2·4	4·9		
Paper, and manufrs. of .	—	3·3	2·2	2·5		
Silk, raw and yarn .	—	—	1·1	2·0		
Cottons . . .	5·8	5·5	—	—		
Total value in £ millions . . .	*67·2*	*50·5*	*78·1*	*60·3*		
Countries :						
United States . .	15·7	22·2	27·8	24·7		
United Kingdom . .	24·5	26·6	19·7	17·1		
Germany . . .	17·5	10·4	12·0	13·2		
Argentina . . .	7·4	12·3	11·5	12·0		
Belgium . . .	5·1	3·8	4·2	4·8		
France . . .	9·8	6·5	5·9	4·4		
Netherlands . .	—	1·1	1·9	3·7		
Italy	3·8	3·9	3·6	3·6		

[1] Included in manufactured iron and steel.

consequence, but in the same province a little to the north there lies what is said to be the greatest reserve of iron ore in the world suited to the acid Bessemer process, deposits mainly comprised of haematite and magnetite containing more than 60 per cent. of iron. Though the deposits are mainly in situations very difficult of access, foreign capital opened up the mines of Itabira, linking the area with the port of Victoria in 1931 and producing over 50,000 tons of pig-iron in 1933 as well as operating ten steel-rolling mills. Brazil has a large output of manganese ores and supplies a large proportion of the world's monazite. Coal-fields are known in the south

and the output is increasing. Sugar refineries exist both in the Federal District in and round Rio de Janeiro and at Pernambuco; and textile industries are growing vigorously—chiefly in the Federal District and in São Paulo. The cotton mills alone employ over 120,000. Railways are so far most numerous in the coffee region of Brazil.

The capital of the republic is Rio de Janeiro, which is also the chief seaport. Its harbour is admirable on account of its commodiousness and safety, and delightful on account of its beauty. Santos, farther south, now surpasses it in the export of coffee. Bahia, or San Salvador, and Pernambuco are the seaports of the region producing sugar, cotton, and tobacco; Manaos and Pará, of the region yielding forest products—rubber, Brazil nuts, cabinet and dye-woods. The ports of the temperate region yielding animal products are Rio Grande do Sul, Pelotas, and Porto Alegre, all of which are accessible only to vessels of small draught, on account of a bar at the entrance to the shallow lagoon on which they all stand.

BRAZIL

GENERAL EXPORTS

—	Percentages of Total Value.					
	1913.	1924.	1926–30.	1931–35.	—	—
Foodstuffs:						
Meat, frozen and chilled	—	0·0	3·3 [1]	2·0		
Coffee (raw)	62·3	75·5	69·9	65·4		
Maté	3·6	2·3	3·1	2·4		
Rubber	15·0	—	2·9	—		
Raw materials	—	—	—	0·8		
Hides and skins	4·6	3·6	5·0	5·0		
Total value in £ millions	*65·5*	*95·1*	*88·2*	*38·0*		
Countries:		1923.				
United States	32·2	41·4	44·4	42·9		
Germany	14·0	5·7	9·6	11·2		
France	12·2	12·4	9·6	10·5		
United Kingdom	13·2	7·0	5·0	8·6		
Argentina	4·7	5·4	6·3	5·3		
Netherlands	7·3	5·6	5·5	4·4		
Italy	1·3	6·5	4·8	3·3		
Uruguay	1·6	3·3	3·3	3·3		
Belgium	2·5	2·6	2·8	3·0		
Sweden	—	2·1	2·3	2·1		

[1] 1928–30 only.

THE GUIANAS. The only portions of the mainland of South America now remaining as possessions of European powers are British, Dutch, and French Guiana. Broadly speaking, each comprises a strip of the fertile lowland, one or more river valleys affording access to the interior, which consists of huge blocks of the forested, undeveloped Guiana massif.

British Guiana has an area of about 90,000 square miles—about the same as Great Britain—and a population of 330,000, of whom about 136,000 are immigrants from India. Of the Indians half live on sugar estates for which they supply the labour. The capital, Georgetown, has 65,000 people. The three great staple crops are sugar, rice, and coconuts. Sugar-cane is the chief plantation crop and is grown on the coastal belt. The cane is often brought to the sugar factory by barge on the canals which were constructed during the Dutch occupation. It will be seen that Britain has attempted to colonise this sparsely populated but potentially productive tract by making it one of the new lands so desirable for the over-populated lands of India. Except for the output of gold and diamonds, little development has yet been possible in the vast interior. Balata is collected and one or two of the numerous timber trees are worked. Most of British Guiana lies in the basin of the Essequibo and its tributaries, and this river forms the great highway into the interior. The chief exports are sugar, rum, molasses, diamonds, rice, gold, balata, bauxite, timber. Georgetown is served by the Canadian National Steamships (see above, p. 714) as well as by other lines.

Dutch Guiana or Surinam is smaller (54,000 square miles), but similar in general character to British Guiana. One-third of the population of 165,000 lives in the capital, Paramaribo. Sugar, rum, rice, cocoa, and coffee are exported. The Dutch colony of Curaçao consists of a number of islands off the coast of Venezuela (see above under West Indies).

French Guiana is the smallest and least developed of the three. The chief town, Cayenne, has half the total population. Since 1854 the colony has had a penal settlement.

VENEZUELA is a republic in the north of the continent, and consists mainly of the basin of the Orinoco with the broad coastal range—an offshoot of the Andes—which runs from east to west and separates the basin from the Caribbean Sea. In recent years, the rich oil-fields around the shallow Gulf of Maracaibo have directed attention to this area. Some of the wells are actually in the floor of the Gulf, the entrance to which is so shallow that only specially constructed tankers can pass through. People of Spanish, Indian, and negro descent, make up the bulk of the population ; and the majority are settled on a small area of highland valleys in the north-west. The chief inland towns are Carácas (the capital) and Valencia, which are situated in inland valleys from 1,800 to 3,000 feet in

height, and are connected by rail and motor roads with their respective seaports, La Guaira and Porto (Puerto) Cabello.

The trade winds blow parallel to the northern coast with the result that the rainfall is often unexpectedly low and there are large areas of scrub ; where the rainfall is higher sugar and cocoa are

VENEZUELA

GENERAL IMPORTS

—	Percentages of Total Value.					
	—	1923.	1926–30.	1931–35.	—	—
Foodstuffs		*13·9*	—	—		
Rice		1·8	1·4	1·7		
Wheat flour		4·3	2·8	3·4		
Wine and spirits		2·6	2·8	1·9		
Raw materials		*8·3*	—	—		
Oils (excluding petrol)		0·3	1·2	2·1		
Cement		0·7	2·0	1·6		
Manufactures		*69·4*	—	—		
Iron goods		3·9	12·5	6·2		
Machinery		3·5	10·5	9·0		
Iron, tin, and lead pipes		—	8·8	3·4		
Cotton goods		22·6	8·7	10·2		
Cars and lorries		2·7	5·1	4·6		
Electrical materials		—	2·1	4·0		
Drugs and medicines		2·5	2·4	4·3		
Paper and manufactures		—	1·4	2·3		
Total value in million bolivares		*143·4*	*369·2*	*161·6*		
Countries :	1911–12.					
United States	52·3	47·4	54·2	46·7		
United Kingdom	13·2	23·5	12·1	17·2		
Germany	6·3	8·9	9·4	10·6		
France	5·7	5·8	5·7	5·8		
Netherlands	—	4·4	6·5	5·3		
Belgium	—	0·4	4·6	4·4		
Italy	—	2·9	2·4	2·3		
Spain	8·3	3·5	2·0	2·3		

Par rate of exchange £1 = 25·25 bolivares. Approximately 1935 £1 = 19·bolivares.

grown on the lowlands, coffee in the valleys, together with cotton in some drier parts. Bananas are often irrigated. The plains (llanos) of the Orinoco are devoted to cattle and horse rearing, an industry at one time much more flourishing than now. Ciudad Bolivar, the collecting centre on the Orinoco, the navigation of which is free to all nations, may also be ranked as a seaport, being accessible to sea-going vessels. Venezuela includes part of the Guiana massif

in the south ; the region is inaccessible, the forests difficult to penetrate, but some gold is produced and balata obtained. From 1923, when the output of oil first became considerable, to 1927 the exports doubled in value and the exploitation of oil (and asphalt from Lake Bermudez) has had a remarkable effect on the development of the whole country, but especially of the north. There the main centres of population are being linked by motor roads and served by motor buses.

VENEZUELA

GENERAL EXPORTS

—	Percentages of Total Value.					
	—	1923.	1926–30.	1931–35.	—	—
Foodstuffs (1918)		*71·6*	—	—		
Coffee		44·4	17·6	7·4		
Cocoa		15·4	4·1	1·6		
Raw materials (1918)		*22·7*	—	—		
Petroleum (crude)		*17·6*	70·5	79·4		
Petrol, fuel, and gas oil		—	1·6 [1]	9·1		
Manufactures (1918)		*1·7*	—	—		
Gold ore (1918)		*2·3*	0·9	1·8		
Total value in million bolivares		*155·4*	*598·0*	*642·3*		
Countries :	1911–12.					
Curaçao	—	33·1	36·6	38·7		
Aruba and Bonaire			20·6	32·5		
United States	32·5	26·8	25·1	18·1		
United Kingdom	8·0	5·2	1·4	1·7		
France	29·2	8·6	2·8	2·1		
Germany	16·9	4·9	4·8	2·0		

[1] Figures are for gasoline and benzine.

COLOMBIA is a republic with a similar population to that of Venezuela, settled chiefly in the upper parts of the valleys of the Cauca and Magdalena, where, in consequence of the high elevation, the grains of temperate climates are grown. In the lowlands, on the other hand, rice is grown ; and it is so generally eaten by the people that a deficiency of this commodity has to be made up for by import.

The mineral wealth is great, including gold and silver, whilst petroleum is now very important and ranks second to coffee amongst the exports. Most of the emeralds of the world come from Colombian government mines. Exports include also coffee—about half the total, sugar, cacao of excellent quality, bananas, and rubber. The sugar is grown at various points of the coast, cacao in the lowlands, and coffee on the mountain slopes of the Cauca valley. The

great channel of communication is the Magdalena, which is navigable for steamers without interruption as high as Honda, but on account of a bar at its mouth was connected with the sea by a railway from Barranquilla to the port of Puerto Colombia, formerly Sabinalla (the chief seaport), and higher up by both canal and rail with Cartagena. Barranquilla itself has recently been made a seaport by the opening of the Bocas de Ceniza. Bogotá, the capital, is within five degrees of the equator, but, in virtue of its situation at the height of 8,000 feet above sea-level, enjoys a healthy climate with a temperature like that of a perpetual spring. It has a population of over 265,000. Medellin is a large mining centre on the Central Andes. Colombia enjoys the advantages of a coast-line along both the Caribbean and the Pacific. The principal port on the Pacific, Buenaventura, was destroyed by fire in 1931 but is being rebuilt. Aerial transport has made a great change in the accessibility of the interior of Colombia and regular services now link the capital with central and North America.

ECUADOR is a republic chiefly south of the equator, but which owes its name to the fact that its capital, Quito, is almost under that line. Quito lies, like Bogotá, between two chains of the Andes, its elevation being between 9,000 and 10,000 feet. The chief seaport is Guayaquil, whence cacao, grown on the western lowlands, is exported. Next in importance among vegetable products are ivory-nuts and coffee and there is a small export of rice. The oil deposits have recently been developed and oil is a leading export. Other minerals include gold; others occur but are little worked. The former difficulty of communication between Guayaquil and the capital was removed by the opening of a metre-gauge railway, 287 miles long, in June 1908. The terminus is on the eastern side of the estuary, opposite Guayaquil, which is now also an air port. The people of Ecuador number over 2½ million, but only 10 per cent. are 'white,' most of the remainder being Indian or half-caste. An interesting native industry is the making of Panama hats, centred at Cuenca, the hats being so called because they reached Europe or the United States *via* Panama. To Ecuador belong the Galápagos, or Turtle Islands, a group situated on the equator, about 700 miles to the west.

PERU is a republic lying to the south of Ecuador, with a population of over 6 million consisting largely of pure Indians. It is composed of three zones—(1) a rainless coast strip, fertilised only here and there by rivers from the Andes, which afford the means of irrigation for sugar and cotton plantations tended by Chinese coolies. (2) The sierra, or valleys and tablelands of the Andes. On one of the tablelands lies (partly in Bolivia) Lake Titicaca, the largest lake in South America, at the height of 12,600 feet above the sea. At this height even barley seldom ripens, and the only

regular food-grain is derived from a native plant called quinoa (wholly unlike our cereals). (3) The Montaña, the region on the eastern slopes of the Andes, containing the headwaters of the Amazon, a district largely covered with impenetrable forests, of which the most valuable product is rubber. The capital of the country is Lima, at the foot of the outer ramparts of the Andes on the coast strip, a few miles from its excellent modern port, Callao.

The chief exports are sugar, petroleum, copper and other metals or ores, cotton, and llama, vicuna, and sheep's wool; the sugar and cotton derived from the coast strip, the wool from the sierra. The mineral wealth for which Peru (including Bolivia or Upper Peru) was noted in Spanish times was long neglected, but in recent years renewed importance has been conferred on it by the laying of railways. Among those already in existence in Peru are two of the most remarkable in the world, those namely by which the tablelands of the Andes are reached. One of these is the Lima-Oroya railway, which attains in its passage through the western chain of the Andes a height of 15,680 feet. This railway has been continued northward to Cerro de Pasco (14,100 feet), and since then productive silver-mines at that place, long abandoned in consequence of flooding, have been reopened, and an even more important copper-bearing district has been developed. The copper mines have benefited greatly by the construction of a branch line leading to a coal-field which is worked by the copper company. From Oroya a line has been constructed southwards to the rich quicksilver area of Huancavelica and is being extended *via* Ayacucho to link up with the southern system. The other Andes railway is from the southern seaport of Mollendo through the irrigation settlement of Peru's second city, Arequipa, to Puno on Lake Titicaca on the one hand, and Cuzco, the ancient capital of Peru, on the other. A steamer service on Lake Titicaca connects Puno with Guaqui, the lake port for La Paz in Bolivia. Chimbote in 9° S., connected by rail with a rich sugar district, has been made into a major port, that is, one with a separate customs station. Talara is the port of the new oil district in the north. The Montaña, previously almost completely shut off from external commerce, has been brought into connection with the outside world by the laying of roads, notably the Central Highway from Lima through Oroya, opened in 1935, which makes possible a road and water journey from the Pacific to the Atlantic. Iquitos is the normal head of navigation on the Amazon system.

BOLIVIA is a republic now entirely inland, occupying the broadest part of the tableland of the Andes, with a Montaña to the east. Of the population of three million only one-eighth is white, more than half pure Indian. The seat of government is La Paz, on the tableland near Lake Titicaca. The Arica-La Paz railway, the

shortest sea-connection (280 miles, as against 534 from Mollendo), rises to nearly 14,000 feet in height, and hence has very stiff gradients —as high as 3 per cent. on certain portions and within a hundred miles of the coast as much as 6 per cent. on a nearly continuous stretch of 25 miles, where a rack-rail is used. Sucre (the legal capital) is on the part of the country drained to the east. The silver-mines of Potosi, discovered in 1545, which made Peru so valuable a possession to the Spaniards, and in the sixteenth century had an extraordinary effect in raising silver prices in Europe, belong to this state, and are still productive, though in a greatly diminished degree. The mines of Huanchaca, terminus of a branch of the railway from the Chilean port of Antofagasta to Oruro, are now much more productive, and the tin-mines, particularly that at Llallagua (the Patino mine), east of Oruro, yield the most valuable Bolivian export. Copper, bismuth, and other metals are also worked, and the eastern forests yield much rubber. The rubber output has decreased since 1917. The boundaries of Bolivia are still disputed and a war with Paraguay from 1932 to 1936 raged over the possession of the Gran Chaco which is believed to be rich in oil. The bulk of the population ekes out a poor existence on the high plateau especially on the southern shores of Lake Titicaca and around La Paz. The capital can now also be reached by three days' railway journey from Buenos Aires.

CHILE is a republic in which whites predominate. The country includes the whole of the coast strip south of Peru, together with the islands that fringe the coast, including part of Tierra del Fuego, and both sides of the Straits of Magellan except in the extreme east. It is 2,500 miles from north to south but nowhere more than 200 miles wide. The northern portion of the country is a continuation of the desert strip on the coast of Peru, and is valuable solely for its mineral products—guano (near the coast from the frontier to about $21\frac{1}{2}°$ S.), nitrate of soda, or Chilean nitrate, as it is called (in the same latitudes, but further inland), gold, silver, and copper. Copper is even more abundant further south, along the base of the Andes, north and south of Coquimbo. Silver is also found more abundantly to the south of Copiapo. The middle portion which enjoys a climate of 'Mediterranean' type, between about 33° and 38° S., contains the bulk of the population. The agricultural products are mainly wheat, barley, and southern fruits—similar, in fact, to those of Spain and California. The temperature, however, is somewhat lower, so that oranges are not grown as a commercial product. The district round Valdivia, about 40° S., is given more to cattle-rearing than agriculture and this southern region enjoys a mild climate resembling that of British Columbia or Britain—though suffering in the hills from excessive rain. In some parts of the north there are admirable irrigation works.

The capital is Santiago, and its port is Valparaiso, on a fine bay looking to the north. Here is received the great bulk of the imports, but since the greater part of the exports consists of mineral produce, chiefly nitrate of soda, copper, and guano, the northern

CHILE

SPECIAL IMPORTS

—	Percentages of Total Value.					
	1911–13.	1923.	1926–30.	1931–35.	—	—
Foodstuffs	—	—	*12·1*	*19·1*		
Sugar	—	4·2	3·8	6·1		
Tea and coffee	—	3·4	3·1	4·1		
Raw materials	—	—	*11·6*	*17·5*		
Industrial oils, resins	—	3·2	3·7	6·8		
Mineral oils (crude)	—	3·4	3·4	5·4		
Coal	8·8	—	0·4	—		
Manufactures	—	—	*72·2*	*61·6*		
Chemicals and drugs	—	—	—	8·6		
Cotton tissues	6·6	13·9	8·5	7·5		
Cotton thread		1·8	1·8	3·9		
Iron and steel	6·1	2·6	3·7	5·0		
Machinery	12·6	3·6	5·8	4·5		
Electrical materials			3·4	3·5		
Vehicles	—	—	3·7[1]	2·5		
Woollen tissues	4·1	—	3·8[1]	2·2		
Paper	—	2·5	2·7	2·6		
Sacks (empty)	2·3	1·9	4·2	1·9		
Total value in million pesos	—	*329·0*	*1317·0*	*330·0*		
Countries:		1924.				
United States	14·1	26·7	31·7	27·2		
United Kingdom	31·3	24·0	17·2	16·6		
Germany	25·9	13·4	14·2	14·6		
Peru	4·6	5·3	5·2	9·8		
France	5·6	5·5	4·7	4·6		
Argentina	4·1	4·3	4·6	4·2		
Italy	2·5	2·8	3·4	2·4		
Belgium	3·4	5·9	5·2	2·3		
Japan	—	—	0·8	1·9		

[1] 1928–30 only.

ports of Antofagasta and Iquique, whence most of the nitrate and guano are shipped, have the largest share in the export trade. A new port has been developed at San Antonio, 43 miles to the south of Valparaiso and only 70 miles from Santiago, with which it is connected by a railway having a maximum gradient of 1·5 per cent. as against 2·8 per cent. on the Valparaiso line. The fact that

Germany and the United States form large markets for nitrate o sodà accounts for the high place taken by those countries in th commerce of Chile as shown in the tables below. The nitrat industry has suffered severely from the world agricultural depression and the competition of artificial fertilisers. Copper ore is mined chiefly in several districts, one immediately to the south of Santiago and Valparaiso, another at Chuquicamata on a branch of the Antofagasta-Bolivia railway, 155 miles from the port mentioned. Iron

CHILE

SPECIAL EXPORTS

—	Percentages of Total Value.					
	1911–13.	1923.	1926–30.	1931–35.	—	—
Foodstuffs	—	—	*7·6*	*10·9*		
Beans, peas and lentils.	1·8	—	1·8	3·4		
Raw materials . .	—	—	*85·1*	*83·8*		
Nitrate of soda . .	77·9	57·7	46·8	29·2		
Copper (bars and ingots) . . .	4·2	23·8	31·5	36·7		
Wool (raw) . .	—	1·6	2·5	5·4		
Manufactures . .	—	—	*4·6*	*3·0*		
Total value in million pesos . . .	—	*537·0*	*1748·0*	*492·0*		
Countries :		1924.				
United States . .	18·3	46·0	34·1	27·4		
United Kingdom .	40·2	28·9	24·9	24·4		
Germany . . .	20·9	4·6	8·6	7·6		
France	5·5	4·1	4·9	4·9		
Italy	—	2·7	2·0	4·8		
Belgium . . .	3·4	1·2	2·2	3·9		
Argentina . . .	0·8	1·5	1·8	2·6		

ore is known to exist in various places, and vast deposits containing more than 50 per cent. of iron have been discovered in the province of Coquimbo. There is a considerable import trade in cattle and other animals from the Argentine Republic across the passes of the Andes, but the export trade by these routes is very scanty. Large numbers of sheep are reared for both wool and mutton round the port of Magallanes (formerly Punta Arenas, the southernmost town in the world) on the Straits of Magellan. Owing to excessive rainfall there is little development of the fiord country of Southern Chile.

The Straits of Magellan are stormy and washed by strong tides, and hence difficult of navigation. Thus the old route, favoured by sailing-vessels, was by the equally stormy, but for them less dangerous, route round Cape Horn, in the south of Tierra del Fuego.

THE ARGENTINE REPUBLIC or ARGENTINA comprises a territory of more than a million square miles. This territory consists mainly of a vast plain sloping down to the Atlantic from the Andes and other lofty mountains in the west and north-west. It extends from within the tropics to the south of the continent, embracing the eastern half of Tierra del Fuego, and thus includes a great variety of climate. The districts in which the population is most considerable and most rapidly increasing are chiefly those in the neighbourhood of the estuary of La Plata and along the right bank of the lower Paraná, where there are not only the greatest facilities for commerce, but where also the climate is most favourable to production and best suited to peoples of European stock. The provinces to which this description applies are Buenos Aires, south of the estuary; Santa Fé, on the right bank of the lower Paraná; Cordoba, to the west of Santa Fé; and Entre Rios, 'between the rivers' Paraná and Uruguay. The climate here is that of the warmer temperate latitudes, generally with an ample rainfall, at least in the eastern districts. These provinces contain nearly all the wheat lands of the republic. Towards the interior the rainfall generally diminishes, and irrigation becomes necessary for cultivation. Towards the foot of the Andes there are irrigation settlements with sugar, vine, and other tropical or sub-tropical plantations. The plain extending eastwards from the Andes in the northern part to the river Paraguay is mainly a region of open forest, and is inhabited at present almost solely by a few tribes of wandering Indians. It is known as El Gran Chaco, or 'the great hunting-ground.' Along the margins accessible from the rivers cattle rearing has been extended and cotton cultivation is carried on.

In the last few decades the Argentine Republic, together with the neighbouring state of Uruguay, has undergone a rapid development similar to that of the United States and Canada. Streams of agricultural settlers have entered the country, mainly from southern Europe. Italians greatly preponderate, immigrants from Spain being next in numbers. In the thirty years ending 1886 upwards of a million immigrants entered the country, and in each of the three years 1886 to 1888 the number considerably exceeded 100,000. In 1889 it exceeded 200,000, but in 1890 a check was put upon this immigration by the occurrence of a great financial crisis. In 1913 the net gain by immigration was 143,000. During the War there was a net loss by emigration, but in 1922 the net gain by immigration had risen to 88,000; in 1923 to 156,000. For the next seven years the average was over 50,000 but changed conditions were evident in 1931 since when there has been a balance of emigrants over immigrants. The diverse racial elements are being consolidated into a nation just as the diverse elements in the United States.

The table of exports given below shows how greatly tillage has gained on the rearing of live-stock. In former days the land, especially in the province of Buenos Aires, was divided up into larg estates given over to the rearing of cattle and horses, but these estates have now been broken up, and in 1918, a law was passed designed to prevent their being formed again. Under this law each homestead is limited to from 50 to 450 acres, and is to be inalienable during the lifetime of the grantee and until his children become o age. On the once open grasslands, square miles of grain are now the rule—maize in the warmer, wetter north ; oats in the cooler damper south (south of Buenos Aires), but wheat in the great crescent stretching from Rosario to Bahia Blanca. The growth of more intensive farming round Buenos Aires is evidenced by the development of dairying (with the help of alfalfa and other fodder crops), whilst the great beef industry relies similarly on specially grown feedstuffs. The vine and sugar-cane are both cultivated, though they yield no export products—the vine on irrigated fields at Mendoza near the base of the Andes, and sugar at Tucuman, in about 27° S. As an illustration of the degree in which the structure of the country exposes it to cold winds from the south, it may be mentioned that these cane-fields have been known to be damaged by frost which more frequently injures the grain crops. An export of fruit has been developed from Mendoza. As to wool see pp. 150–1, and as to quebracho see p. 276. The **mineral wealth** of Argentina is not great, the principal mineral at present exploited being oil, of which the principal wells lie near Rivadavia on the coast about 46° S. There is also a field to the north, in the Andine foothill belt.

To what is said about the Paraguay and lower Paraná on p. 776, it may here be added that sea-going vessels can ascend the Paraná to Rosario, that the Paraná is likewise navigable for steamers above the confluence of the Paraguay as far as the limit of the Argentine frontier, that steamers can ascend the Uruguay River on the eastern frontier as far as the falls, which occur in about 31½° S. (at the Uruguayan town of Salto), and that sea-going vessels of fourteen or fifteen feet draught can reach as far as the Uruguayan town of Paysandu. Great falls occur on the Iguazu on the northern frontier of the Misiones territory, and the power resources are being developed. The Pilcomayo, on the northern frontier, is navigable for 240 miles, and the Rio Negro in the north of Patagonia affords 300 miles of navigation through a region deemed a few years ago scarcely fit for settlement, but which has now been stocked and settled along the whole course of the river. Patagonia, the territory south of the Rio Negro, is mainly a stony desert, but there is a considerable amount of more fertile land along the base of the Andes. On the coast of this territory there has long been a Welsh colony

ARGENTINA

SPECIAL IMPORTS,[1] INCLUDING SILVER BULLION

Principal Articles.	Average Value in Millions Sterling. 1876–80	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '76–80	'01–05	'06–10	'11–13	'25–29	'33–35
1. Iron and steel, total	—	3·77	—	11·97	30·41	—	12·7	—	15·4	20·2	10·0
Machinery and tools	—	1·72	3·43	4·12[2]	5·23	—	5·8	5·8	5·3[2]	3·5	—
Unwrought, galvanised, and tinplate	—	1·20	2·26	2·53	—	—	4·1	3·8	3·3	—	—
Rails and fishplates	—	0·86	2·25	1·76	—	—	2·9	3·8	2·3	—	—
2. Cottons, pure	*1·11*	2·93	3·98	5·53	13·36	*13·2*	9·9	6·7	7·2	8·9	—
3. Coal and coke	0·14	1·63	3·67	5·34	6·92	1·7	5·5	6·2	6·9	4·6	6·5
4. Chemicals and dyes	—	1·19	2·27	3·39	5·48	—	4·0	3·8	4·5	3·6	—
5. Wine	0·96	1·05	1·96	2·01	0·58	11·3	3·5	3·3	2·6	0·4	—
6. Sackcloth	—	1·15	1·39	1·70	4·65	—	3·9	2·3	2·2	3·1	—
7. Wood and manufactures	—	2·08	1·38	3·05	4·60	—	7·0	2·3	3·9	3·1	4·0
8. Apparel	—	0·62	1·35	1·91[2]	—	—	2·1	2·3	2·5[2]	—	—
9. Railway matls. exc. rails	—	0·51	1·27	1·17[2]	2·69	—	1·7	2·1	1·5[2]	1·8	—
10. Paper and manufactures	—	0·67	1·26	1·88	4·30	—	2·3	2·1	2·4	2·9	—
11. Woollens	—	0·70	1·02	1·29	4·77	—	2·4	1·7	1·7	3·2	—
12. Olive oil	0·16	0·34	0·62	0·83	2·45	1·9	1·2	1·0	1·1	1·6	—
13. Petroleum and petrol	—	—	—	—	—	—	—	—	—	—	10·0
Average total value	8·41	29·63	59·33	77·58	150·30						

Principal Countries.	Percentages. '76–80	'01–05	'06–10	'11–13	'25–29	'33–35
1. Utd. Kingdom	26·2	33·9	33·4	32·5	20·0	23·0
2. Germany	5·0	13·6	15·4	18·2	12·0	9·5
3. United States	6·7	13·4	13·8	17·4	25·0	13·0
4. France	20·4	9·5	9·7	10·3	6·6	5·0
5. Italy	5·8	11·0	8·9	8·8	8·1	7·5
6. Belgium	5·5	5·1	5·0	5·6	5·0	5·0
7. Spain	5·6	2·9	2·9	3·2	2·2	2·6
8. Brazil	5·5	3·5	2·6	2·5	0·8	5·5
9. Uruguay	5·9	0·5	0·8	0·8	1·3	0·5
10. Netherlands	—	0·6	0·7	1·0	—	1·4

SPECIAL EXPORTS, INCLUDING SILVER BULLION

Principal Articles.	Average Value in Millions Sterling. 1876–80	1901–05	'06–10	'11–13	'25–29	Percentages of Total Value. '76–80	'01–05	'06–10	'11–13	'25–29	'33–35
1. Wheat	0·06	9·56	18·25	18·61	40·89	0·6	20·7	26·5	21·8	22·2	19·0
2. Raw wool	4·12	10·14	11·35	10·18	13·88	43·6	21·9	16·5	12·0	7·5	6·5
3. Maize	—	6·64	9·73	10·84	31·05	—	14·4	11·1	12·7	18·5	2·0
4. Linseed	—	4·41	7·97	7·78	22·39	—	9·5	11·6	9·1	12·2	13·0
5. Raw hides	1·66	4·77	6·06	9·13	12·66	17·6	10·3	8·8	10·7	6·9	5·0
6. Beef, chilled and salted	0·53	2·28	3·95	8·65	13·80[3]	5·6	4·9	5·7	10·2	7·5	11·0
7. Oats	—	0·08	1·32	3·57	2·99	—	0·2	1·9	4·2	1·6	1·4
8. Tallow and grease	0·69	0·97	1·26	2·18	3·00	7·3	2·1	1·8	2·6	1·6	1·3
9. Mutton, frozen	—	1·24	1·14	—	2·88	—	2·7	1·7	—	1·6	2·0
10. Wheat flour	—	0·70	0·99	1·25	2·20	—	1·5	1·4	1·5	1·2	0·7
11. Bran	—	0·42	0·86	1·01	1·35	—	0·9	1·2	1·2	0·7	0·9
12. Cattle	—	0·69	0·55	1·65	1·38	—	1·5	0·8	1·9	0·7	0·3
Average total value	9·44	46·21	68·98	85·22	184·16						

Principal Countries.	Percentages. '76–80	'01–05	'06–10	'11–13	'25–29	'33–35
1. Utd. Kingdom	10·8	15·8	19·5	26·6	27·5	36·5
2. Germany	3·3	11·9	11·4	12·3	11·1	7·5
3. France	23·5	13·9	10·4	9·0	6·5	5·5
4. Belgium	27·7	7·1	9·4	8·4	8·5	9·5
5. United States	7·0	4·6	5·1	6·3	8·9	8·5
6. Brazil	4·3	4·3	4·4	5·2	3·8	4·5
7. Italy	3·3	2·1	2·5	4·4	5·7	4·0
8. Netherlands	0·1	1·4	1·3	3·6	7·0	10·0
9. Spain	1·9	0·9	0·8	0·8	0·7	0·8
10. Chile	4·7	0·5	0·6	0·6	0·7	0·6
11. Uruguay	3·0	2·0	0·6	1·1	—	0·8

[1] All figures up to 1913 (including totals) are the 'Valores de tarifa' or the 'Valores nominales.' In 1925–29 the tariff values are taken for imports but 'real values' ('Valores reales' or 'Valores efectivos') for exports. Exchange rate for 1925–29, calculated on the yearly average, is 5·08 pesos = £1 sterling.
[2] Average of the two years 1911, 1912 only.
[3] 'Chilled' only.

at Chubut in lat. 43°, where sheep are reared and some wheat is grown and there are other isolated settlements, more numerous in the sheep lands of the extreme south.

As in the United States, **railways** were the means used to promote the commerce on which the immigration depended. A mere glance at the railway map on p. 778 is enough to show that the Argentine Republic is the part of South America in which railway construction has been most active. Unfortunately these railways are on different gauges. Nearly all those which radiate from Buenos Aires are on the gauge of 5 feet 6 inches, but some of those which radiate from Rosario, and nearly all starting from Santa Fé, are on the metre gauge. Those in the provinces between the Paraná and Uruguay are on the gauge of 4 feet 8½ inches, which allows of direct communication with the railways of Uruguay, while the difference from other Argentine railways is of little consequence so long as the Paraná is not bridged or likely to be bridged. The railway connection of Buenos Aires with Asuncion by way of Encarnacion and a train-ferry across the Paraná at this point dates from October 1913. It involved in Paraguay the addition of a third rail to adapt the trains to the Paraguayan gauge of 4 feet 8½ inches. See also p. 775. Much of the railway construction was carried out by British capital. The plains of the pampas are almost devoid of stone and this has greatly hindered the making of roads. Progress is now being made with concrete highways.

The capital of the republic is Buenos Aires, which stands on the River Plate, and is at the same time the chief seaport. So shallow is the river at this place that all large vessels formerly had to anchor ten miles out, but large harbour works have been carried out, resulting in providing the port with excellent modern docks. These works have deprived Ensenada, the port of La Plata, lower down the estuary, of a good deal of its trade, in spite of its artificial harbour available for vessels drawing 25 feet; but the importance of that part of the province of Buenos Aires which forms the hinterland of Bahia Blanca has assured that port a large trade. For the wheat, maize, and linseed trade of Argentina it is extremely important that Rosario, the great collecting centre for the northern part of the region producing these commodities, is accessible to ships of large draught—up to 25 feet. The more northerly collecting centre of Santa Fé has deep water close at hand at its port of Colastine, but a bar between it and Rosario hinders the access of sea-going vessels.

URUGUAY is a republic lying between the estuary of the La Plata and Brazil. It has a similar surface, climate, and population, and similar industries to the neighbouring provinces of the Argentine Republic, and has been as rapidly developed. Among the railways there is one avoiding the rapids of the Uruguay River above Salto

URUGUAY

COUNTRIES OF ORIGIN AND DESTINATION

From	Percentages. '91–95	'06–10	1913	'25–29	'33–35	To	Percentages. '91–95	'06–10	1913	'25–29	'33–35
1. Utd. Kingdom	31·5	29·7	24·5	15·6	18·0	France . .	18·8	20·1	17·4	12·1	8·0
2. Germany .	11·1	16·2	15·5	11·1	8·6	Argentina .	13·8	18·3	10·6	11·9	17·0
3. France . .	10·8	10·3	8·1	5·9	2·7	Belgium .	13·0	15·8	12·0	7·6	6·0
4. United States	6·2	9·7	12·7	29·8	13·0	Germany .	5·6	12·9	19·5	15·8	15·0
5. Italy . .	9·6	7·8	6·9	4·9	4·9	Brazil . .	20·2	9·1	6·7	5·1	—
6. Argentina .	7·0	7·3	11·5	9·3	11·0	Utd. Kingdom	14·7	7·2	11·2	23·0	28·0
7. Belgium .	5·0	6·5	6·8	5·7	4·0	United States	7·1	6·4	4·0	10·8	11·0
8. Brazil .	8·3	5·0	6·8	5·1	8·0	Italy . .	1·5	3·3	4·2	6·0	8·0
9. Spain . .	8·8	5·0	4·6	3·8	2·0	Cuba . .	1·3	2·6	3·6	1·3	—
Total value .	4·43	7·80	10·69	17·13	—	Total value.	6·11	8·12	14·54	19·80	—

URUGUAY

SPECIAL IMPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '91–95	'06–10	'11–13	'25–29	Percentages. '91–95	'06–10	'11–13	'25–29	'33–35
1. Cottons	0·45	0·55	0·61	1·01	10·2	7·1	6·5	5·9	—
2. Iron and steel manufactures	0·30	0·53	0·67	0·98	6·7	6·8	7·1	5·7	3·0
3. Sugar and molasses . .	0·27	0·46	0·47	0·76	6·2	5·9	5·0	4·4	6·5
4. Wood	0·11	0·46	0·76	0·61	2·4	5·9	8·2	3·6	1·6
5. Coal	0·20	0·44	0·55	0·84	4·5	5·6	5·9	4·9	5·3
6. Wine	0·52	0·34	0·34	0·10	11·7	4·4	3·6	0·6	—
7. Yerba maté	0·16	0·24	0·25	0·35	3·7	3·1	2·7	2·0	3·3
Average total value .	4·43	7·80	9·33	17·13					

SPECIAL EXPORTS, EXCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions Sterling. '91–95	'06–10	'11–13	'25–29	Percentages. '91–95	'06–10	'11–13	'25–29	'33–35
1. Wool, raw	1·78	3·26	6·54	6·12	29·1	40·2	45·0	30·9	35·0
2. Hides and skins, raw . .	1·57	1·94	1·83	2·51	25·7	24·0	12·7	12·7	12·0
3. Meat, salted or smoked .	0·96	0·80	1·30	6·18[1]	15·7	9·9	9·0	31·2[1]	25·0[1]
4. Tallow	0·34	0·30	0·52	0·62	5·6	3·7	3·6	3·1	2·0
5. Meat extract	0·42	0·25	—	0·30	6·8	3·1	—	1·5	2·0
6. Cattle	0·18	0·21	0·20	0·72	2·9	2·6	1·4	3·6	4·0
7. Wheat and flour . . .	0·26	0·19	—	0·90	4·3	2·3	—	4·6	3·0
8. Linseed	—	0·09	0·43	0·72	—	1·1	3·0	3·6	5·0
9. Horse hair	0·07	0·07	—	—	1·2	0·9	—	—	—
Average total value .	6·11	8·11	14·54	19·80					

[1] Mainly chilled and frozen meat.

which is now connected by rail with Paysandu and Montevideo All the railways are on the 4 feet $8\frac{1}{2}$ inch gauge, but that which run north from Montevideo to the Brazilian frontier has a third rail t enable it to connect with a Brazilian system on the metre gauge. Having a greater rainfall on the whole than the more populous districts of the Argentine Republic, Uruguay rears relatively to area more cattle than the latter country. The business of meat-packing has made the small towns of Fray Bentos and Paysandu, on the Uruguay, well known throughout Europe. The tables below illustrate the growth of foreign commerce. The capital of Uruguay is Montevideo, which has a harbour better by nature than that of Buenos Aires, and which has been made into a first-class port by harbour works, so that large vessels anchor alongside the quays.

PARAGUAY is an inland republic lying mainly between the Paraguay and Paraná Rivers, with a very sparse population, chiefly of native Indians. The capital is Asuncion, a river port. Its chief export products are tobacco, Paraguay tea, or maté, and oranges, orange-trees growing wild or cultivated almost everywhere in the republic. Quebracho, timber, and skins are also exported. Timber is now the principal industry of the country, and cotton is becoming a promising crop. The railway now connecting Asuncion with Buenos Aires runs through the maté-producing region, which is also important for its timber forests. The resources of the Chaco include oil, and the boundary line was the subject of the war with Bolivia in 1932–36.

The **FALKLAND ISLANDS**, situated to the east of the Straits of Magellan, belong to Great Britain. They have a damp, foggy climate, and are largely covered with peat, but are inhabited by a small number of settlers engaged in the rearing of sheep and cattle. There are very large numbers of sheep compared with the population. A considerable export trade in frozen mutton has sprung up. The colony includes the island of South Georgia, important as a whaling base, and certain islands in the South Atlantic.

TOWNS OF SOUTH AMERICA

Argentina (1935).	
Buenos Aires	2,247,000
Rosario	500,000
Cordoba	280,000
La Plata	200,000
Avellaneda	160,000
Tucuman	130,000
Balina Blanca	100,000

Brazil (1935).	
Rio de Janeiro	1,701,000
São Paulo	1,151,000
Recife	455,000
San Salvador	358,000
Bahia	345,000
Porto Alegre	307,000
Belem	306,000
Bello Horizonte	156,000
Fortaleza	140,000

Bolivia (1932).	
La Paz	150,000
Cochabamba	49,000

TOWNS OF SOUTH AMERICA—*continued.*

Chile (1930).

Santiago	696,000
Valparaiso	193,000
Concepcion	78,000
Antofagasta	54,000

Ecuador (1934).

Quito	110,000
Guayaquil	131,000

Colombia (1933)

Bogota	265,000
Medellin	186,000
Barranquilla	150,000
Cartagena	123,000
Cali	104,000
Manizales	101,000

Venezuela (1932).

Caracas	141,000
Maracaibo	75,000

Paraguay (1934).

Asuncion	96,000

Uruguay (1935).

Montevideo	666,000

Peru (1931).

Lima	281,000
Callao	64,000
Arequipa	46,000

British Guiana (1931).

Georgetown	65,000

AUSTRALIA AND POLYNESIA

AUSTRALIA[1]

The vast island continent of Australia has an area of nearly three millions of square miles, and is accordingly almost exactly equal in extent to the United States of North America, exclusive of the territory of Alaska. A good deal more than one-third of it lies within the tropics, but the great bulk of its population is to be found in the region outside of that belt. Most of the inhabitants, moreover, are found within two or three hundred miles of the coast, and from the nature of the climate this can never be otherwise.

The coast-line of this vast island is remarkable for its long stretches of uniform character, without inlets that can be made use of by shipping even for shelter. The principal exceptions to this character are on the eastern side, and in some parts of the north-west.

To the north of Hervey Bay, on the east coast, numerous coral reefs rise to the surface of the water, making the seas somewhat dangerous to shipping, and about one degree north of the Tropic of Capricorn there begins a series of coral reefs such as are to be seen nowhere else in the world over the same extent of sea. These form together what is known as the **Great Barrier Reef,** which extends for a distance of about 1,200 miles, advancing into the latitudes of Torres Strait, which it nearly closes. Its widest part is in the south, where it extends for about 100 miles from east to west, and in that part also it lies farthest from the coast. As it narrows towards the north it comes nearer to the coast, being in many places within ten miles of the land, opposite the promontories, and generally not more than fifteen or twenty miles distant. At low tide the surface of the reef is just about the level of the surface of the water, and at all states of the tide the border of the reef can be distinguished by the strong breakers that wash over it. The reef, however, is not continuous. It is broken up by many deep channels, some of which are narrow, others from ten to twelve miles wide. To seamen

[1] This section has been revised by the Official Secretary to the Commonwealth of Australia, London, to whom grateful thanks are tendered. The sections on each of the States were revised in the same way by the Agent-General of each in London.

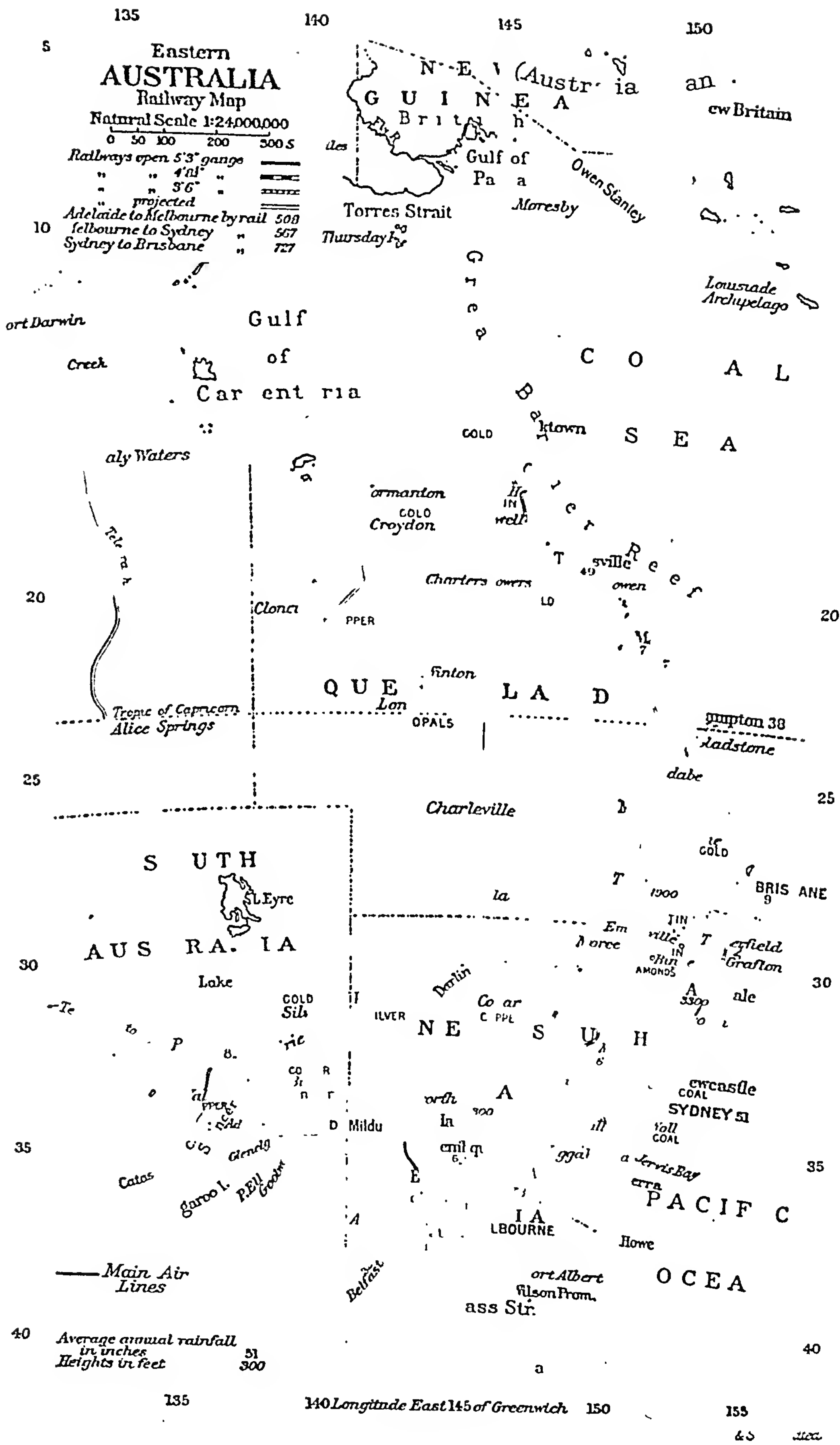
these channels are of great importance, since they allow of a choice of routes between the seaports in the east of Australia and Torres Strait. The route within the Barrier Reef along the Australian coast has the advantage of a calm and beautiful sea owing to the protection which the reef affords, and is that now generally used. But this route is one that requires careful navigation, and above all at night, when the reef cannot be made out at a greater distance than half a mile. By day it is visible at a distance of four miles from the bridge and seven miles from the rigging. Hence, sailing-vessels that took the inner route proceeded on their course only by day, anchoring for safety at night. For the most part such vessels went outside of the reef altogether into the open ocean, and passed through one of its northern channels into or out of Torres Strait.

Even to the west of the Barrier Reef the navigation of **Torres Strait** has been made difficult by the coral-builders. The hundred miles of sea between Cape York and the south coast of New Guinea, besides being studded with numerous small islands, is crowded with coral reefs and sandbanks, which leave only one or two safe channels for shipping between them. The channel most used is that which lies immediately north of the Prince of Wales group of islands, on one of which, named Thursday Island, there is a much-frequented calling station for shipping.

Off the southern part of the east coast of Australia there is at all seasons a strong current setting southwards. It forms a broad belt at a distance of from twenty to sixty miles from the land, on which account vessels going northwards to Sydney sometimes keep more than sixty miles from shore to avoid the current, and those going southwards keep within the current to take advantage of it.

The **surface** of Australia is for the most part fairly level, consisting of either plains or plateaus of great extent. In the east, however, a continuous range of highlands runs at no great distance from the coast from north to south, and then bends with the coast westwards, terminating in the south-east of the state of South Australia. The general name of Dividing Range is given to the whole of this series, since it separates the low-lying coast valleys and small plains from the broad plains of the interior. In the south-east, where the Dividing Range attains its highest elevation (with peaks above 7,000 feet in height), it forms a regular mountain chain known by the name of the Australian Alps. The flat-topped ranges in New South Wales, to the west of Sydney are known as the Blue Mountains.

The Dividing Range has been the chief obstacle in the establishment of **railway communication** with the interior—an obstacle which has been overcome in some places, especially in New South Wales, only by great engineering skill. The map on p. 798 shows that there is no railway connection of the coast with the interior



Eastern
AUSTRALIA
Railway Map
Natural Scale 1:24,000,000
0 50 100 200 500
Railways open 5'3" gauge
4'8½"
3'6"
projected
Adelaide to Melbourne by rail 508
Sydney to Brisbane 727
Torres Strait
Gulf of
Moresby
Owen Stanley
ew Britain
Lousiade Archipelago
Gulf
of
Car ent ria
C O A L
S E A
Croydon
Charters owers
Q U E
L A D
Alice Springs
Charleville
S UTH
AUS RA. IA
L.Eyre
Lake
BRIS ANE
Grafton
SYDNEY 51
PACIF C
OCEA
Main Air Lines
ass Str.
Average annual rainfall in inches 51
Heights in feet 300
135
140
145
150
140 Longitude East 145 of Greenwich

between Melbourne and Sydney, and a careful study of physical maps shows that this is a natural consequence of the superficial configuration, which is thus disadvantageous for both the states to which these ports belong, but at the same time favourable to the ports themselves, as concentrating upon each a greater amount of traffic than would otherwise have fallen to them. Both railway maps also show the lack of uniformity in gauge, a defect which is every year becoming more serious as the interstate traffic increases, and is engaging the earnest attention of the Federal government, unification having been accepted in principle.[1]

The plateau in the east of Australia attains at its widest a breadth of rather more than one hundred miles, and gradually sinks on the west to the low level plains, which occupy the greater part of the middle of Australia. The western half of the island consists mainly of a great plateau about 1,000 feet in height.

The series of highlands above described is appropriately called the Dividing Range, not only on account of the contrast presented by the surface on different sides of it, but also because of the influence which it has upon the **climate.** The chief rain-bearing winds of Australia blow more or less from the east, since the island lies mostly in latitudes in which the south-east trade wind prevails, and the causes which give rise to that wind have a great effect on the direction of the air-currents even on the land. Hence, in the western half of the island the prevailing tendency of the winds is seawards. The period of the year in which this tendency is mostly overpowered is the summer, when the excessive heat of the interior brings about great rarefaction of the air, but at the same time tends to prevent much of the vapour brought from the sea from being condensed into rain. The extreme north of Australia, being within 12° of the equator has conditions of heat and moisture approaching the equatorial. As to the climate of the extreme south-west see p. 39. The highlands on the east, however, have their usual effect on seaborne vapours, and their eastern slopes are copiously watered at all seasons of the year, but in the tropical and sub-tropical latitudes chiefly in summer. The interior plains and plateaus, on the other hand, receive less and less rain the farther they are distant from the sea, and almost all parts which are more than two hundred miles from the coast receive much less rain in the course of the year than the driest parts of England. This rain, too, falls in latitudes in which the heat and consequent evaporation are greater than in the British Isles, so that in summer the ground is everywhere parched and cracked, and the grass withered, and none but winter crops can

[1] The *Official Year Book* of the Commonwealth No. 18 (1925) estimates the cost of converting the whole of the lines in the States concerned to the standard gauge at £57,200,000, but unofficial estimates place the figure at £100,000,000. The first estimate was £21,000,000.

be grown, even where the rainfall is sufficient to grow crops at And even if the average rainfall is adequate for the crops usua grown and for the wants of the live-stock reared, it is in many pa very precarious, years of flood alternating with years of droug leading to great variations in the yield of the crops and the num of sheep and cattle that can be reared in a given area.

Between the northern part of Australia which lies within t tropics, and the southern part, from 10 to 15 degrees beyond t tropics, there are of course great differences in the temperatur but in all parts of Australia there is in the low grounds no wint of snow and frost to interrupt the labours of the field or to ma it necessary to provide shelter for horses and cattle.

The nature of the climate of Australia explains that of t Australian rivers. Most of those which enter the sea on the ea and south-east of the Dividing Range are comparatively short, b are generally well supplied with water all the year round. The vary greatly in their depth according as the weather is dry or rain and they are in many cases apt to overflow their banks. Many o them are navigable for a shorter or longer distance ; but they brin down so much sediment from the neighbouring highlands in whicl they take their rise, or from which they derive their feeders, that bar are formed in many cases at their mouths, and the entrance of larg vessels is thus prevented or impeded.

All the great rivers of Australia take their rise on the inne slopes of the tableland, and flow towards the west or south-west. Only one of these, the Murray, enters the sea by an independent mouth. Before entering the sea this river turns nearly due south and flows through a large shallow sheet of water called Lake Alexandrina, which communicates on the south with Lake Albert, and a long shallow lagoon known as the Coorong, separated from the sea by a broad line of sand-dunes. The longest tributaries of the Murray are those which it receives on its right bank, the Murrumbidgee and the Darling, the former of which receives on the right another great tributary, the Lachlan. These rivers might all be ranked among the great rivers of the world if we considered only their length (the Murray and the Darling being both much more than 1,000 miles long), but the climate of the region through which they flow causes them to be very scantily supplied with water. The Darling even dries up in summer in many parts of its course into a chain of small lakes.

Nevertheless all these rivers are navigable by steamers of shallow draught for a long distance into the interior. In ordinary circumstances the Murray can be ascended to Albury, 1,700 miles up, where the river is crossed by the railway from Melbourne to Sydney. Unfortunately, however, this river navigation cannot be continued into the sea. The line of sand-dunes which separates the Coorong

from the sea is continued in the form of a bar across the mouth of the Murray, where it leaves Lake Alexandrina, so that goods must be laid down or taken up at some point in the course of the river and carried the rest of the distance by land. Under the Murray Waters Agreement which came into force in 1917, works were undertaken involving the construction of twenty-six locks on the Murray and nine on the Murrumbidgee, with a view to improving the navigation and increasing the facilities for irrigation. The Hume Reservoir and Lake Victoria storage are part of the scheme. Apart from providing permanent navigation for river vessels for 1,250 miles, the total area irrigated is 1·4 million acres (2,000 square miles—an area as large as Norfolk). The scheme was finished in 1937.

Of the other long rivers which are to be seen on maps traversing the plains in the interior of Australia, the greater number are hardly rivers at all in the proper sense of the term. They are merely watercourses which may be filled at times with running water, but which are often empty except for a few days in the year. Many of them after a longer or shorter course dry up and disappear, their water having all sunk down into the porous sand which forms their bed, or evaporated under the heat of the sun. The most important of the streams that end in this way is the Diamantina, which enters South Australia from the south-west of Queensland. Others empty themselves into large shallow lakes, which in summer shrink greatly in dimensions. There are several such salt lakes in the lower parts of Australia, the chief being Lake Torrens and Lake Eyre, into the latter of which flows at certain seasons the Barcoo River, or Cooper's Creek, the longest of these feeders of inland lakes. In the dry period of the year this river in its lowest part creeps on more and more slowly, and in the end dries up like the Diamantina, though the course which it follows in times of flood, when it swells to a breadth of two miles and increases in depth to twenty feet, can still be distinguished by the grass and trees by which it is bordered.

The use of the great rivers of the Australian plains as navigable highways and for the watering of flocks has long been known, and the gradual slope of the plains over which they flow admits of many large tracts being irrigated by their means. The irrigated areas are mainly in the Murray Basin. In New South Wales, Victoria, and South Australia a valuable source of water is from the famous artesian basins—especially the Great Basin and the Murray River Basin. The former is pierced by nearly 2,000 bores, in Queensland, New South Wales, and South Australia. The water is excellent for stock but owing to a considerable proportion of salts cannot be used for irrigation.

Vegetation. On the tableland and plains of the interior an Australian forest is open and easily traversed either by a horseman

or even by motors, and leaves plenty of space for grass and herba on which sheep may be pastured. Such is the general character the Australian bush. The forests become thinner and thinner t scantier the rainfall. In many of the more arid parts large stretch of ground are occupied by dense masses of low bushes difficult penetrate and difficult to destroy, these patches being well kno as ' scrub ' ; and in more arid regions still the bushes forming t scrub are often armed with strong sharp spines, which tear t clothes and the flesh of those who try to force their way throug Even some of the grasses, notably the well-known spinifex, h sharp-pointed leaves. In tussocks this grass covers by itself vast area in the deserts of the west. Most of the native grasses of Australi are nutritious, and among these the tall kangaroo grass is notabl for its power of withstanding long drought. And even where th climate is so dry that grasses do not thrive, there are certain herb which will still thrive and yield good food for sheep and cattle The most valuable of all these is the salt-bush, an ugly grey shru about two feet high, which, as its name indicates, flourishes on saline soil, such as is apt to be found where rain is scarce an evaporation great, but which is all the better for sheep on tha account, since the sheep that are fed on a saline herbage are reported to furnish the finest wool, and are free from certain diseases to which they are liable in other districts. Owing to the variations in rainfall there is thus usually a ring of forest round the continent which gives place to open forest, bush and scrub and finally to semi-desert and desert in the dry heart of the continent. There is not the difference one would expect between the tropical and temperate parts of the continent owing to the highly peculiar character of both flora and fauna. The most typical trees are the eucalyptus or gum trees and species of acacia, whilst the typical animals are the marsupials, notably the kangaroo. The danger of upsetting the ' balance of nature ' by introducing wild or semi-wild plants and animals into a country where they are free from hereditary enemies is well seen in the case of the prickly pear (which has overrun thousand of acres) and the rabbit.

People. The aboriginal Australians belong to a very old type of humanity (allied to the fossil Neanderthal man of Europe), are few in numbers, and appear to be fast dying out. The level of their material culture is low though their social organisation is complex. They were never numerous, perhaps 150,000 when Cook landed, and their total number is estimated now at about 60,000. The majority live in the north and west, as do also the 20,000 half-castes. The first inhabitants sent from the British Isles to Australia were convicts, and the first ship containing convicts sailed in 1787, and arrived at Botany Bay, in New South Wales, early in 1788. Soon free settlers began to arrive.. These were mainly

from the British Isles, but there were also many Germans. Chinese (these nearly all men) and Polynesians were introduced into Queensland as labourers on the tropical plantations, but under the legislation of the Commonwealth not only is the introduction of all coloured labour prohibited, but even that of white labourers under contract, unless it can be shown that the labour which these supply is of a kind that cannot be obtained in the Commonwealth. Under the Pacific Island Labourers' Act no Pacific Islanders were allowed to enter Australia after March 31, 1904, or were to be allowed to remain there after the end of 1906. However, the bulk of the immigrants throughout Australian history have been free British citizens attracted by the possibilities of a great new land. At the present day aliens constitute an almost negligible percentage of Australia's seven million people. The 'White Australia' policy is still firmly adhered to, although there are grave doubts whether tropical Australia can ever be adequately developed without the help of coloured labour.

A comparison between Australia and South Africa. An interesting comparison may be made between Australia and South Africa so far as they correspond in latitude, both in respect of resemblances and differences. The northernmost latitude of Australia corresponds to that of the mouth of the Rovuma in South Africa, but Australia (excluding Tasmania) extends, in the south-east, four degrees beyond South Africa. These areas both lie between two oceans, and are so far similar in structure that they both have ranges of mountains running parallel to the east coast and then turning west to face the south coast and have a large extent of high plains in the interior; but they differ in that the eastern mountains are much higher in Africa than in Australia, in that the southern mountains are found only in the east of Australia, but extend along nearly the whole width of South Africa with terraces intervening between the mountains proper and the sea, in that the higher plains of Africa are towards the east, those of Australia (mostly much lower) towards the west, and that in Australia a broad belt of low plains intervenes between the higher elevations of the west and east. There is the further notable difference that Australia is an island, South Africa only part of a much larger continent. This latter difference probably contributes, along with the higher altitudes of the African mountains, to explain the somewhat striking contrasts in the seasonal distribution of the rainfall between places in corresponding latitudes on the eastern side, which in both is that which has on the whole the most abundant rainfall.

The proportion of winter rains in South Africa is small compared with that at the corresponding Australian stations. The higher winter rainfall in Australia is no doubt largely due to the fact that situation and structure leave the east side of that continent open to

vapour-bearing winds both from the north and south; and this again will go far to account for the fact that the pasturage of Australia is more succulent and freer from injurious thorny and prickly vegetation than that of South Africa, and that the Australian continent on the east side has much larger areas suited for wheat than the same side of Africa. In the areas of Mediterranean climate Perth is 2° farther north than Cape Town, a latitude at which on the west side of South Africa the rainfall of the year is quite negligible, which explains why in this part also Australia has a much greater area suited to wheat than South Africa. In temperature, it should be noted, there is little difference between the corresponding stations in spite of differences in altitude. Another very important difference resulting from Australia being an island is that there is no such native question there as forms such a serious problem in South Africa, that in Australia the white man can and does work with his hands without the sense of lost dignity.

The **AUSTRALIAN COMMONWEALTH** was constituted under an act of the Imperial Parliament passed in 1900, and was proclaimed at Sydney on January 1, 1901. The six former colonies of Victoria, New South Wales, Queensland, South Australia, Tasmania and Western Australia formed the six original states of this Commonwealth. The legislative powers of the Commonwealth Parliament include taxation, currency and coinage, bills of exchange and promissory notes, bankruptcy and insolvency, insurance and banking (other than state), copyrights, trade marks and patents, immigration and emigration, naturalisation, the influx of criminals, invalid and old age pensions, marriage, divorce, and matrimonial causes, foreign corporations, external affairs, external and interstate trade and commerce (but so as not to affect the freedom of interstate trade, commerce and intercourse), postal and similar services, naval and military defence, public borrowing, and other incidental matters.

The site of the permanent capital, to which the name of Canberra was given on March 12, 1913, on the occasion of the initiation of the operations for laying out the city, is an area at the height of from about 1,800 to upwards of 2,000 feet above the sea, lying in a piece of territory in the south-east of New South Wales, by which the territory was ceded to the Commonwealth on January 1, 1911. It has already been connected by rail with the New South Wales railway system, and a railway is also to be laid connecting it with Jervis Bay, where other land has been ceded to the Commonwealth for the formation of a commercial port and naval station. The government departments were gradually removed to Canberra from Melbourne, which was the temporary seat of the general government. The Parliament Houses were opened in 1927 by the Duke of York, now King George VI.

States and Territories of the Commonwealth.	Area in thousands of square miles.	Ratio to Great Britain.	Population in thousands. 1871.	1901.	1921.	1936.	Population per square mile. 1935.	Millions, 1933–34. Sheep.	Cattle.	Acres Cultivated.
Victoria	88	1	732	1,208	1,532	1,843	20·9	17·0	2·1	5·2
New South Wales	309	$3\frac{1}{2}$	504	1,360	2,100	2,656	8·6	52·0	3·4	6·2
Queensland	671	$7\frac{1}{2}$	120	503	756	972	1·4	22·0	6·1	1·3
South Australia	380	$4\frac{1}{3}$	186	366	495	586	1·5	8·0	0·3	5·0
Western Australia	976	11	25	195	332	447	0·4	11·0	0·9	4·2
Tasmania	26	$\frac{2}{5}$	102	173	214	230	8·9	2·0	0·3	0·2
Northern Territory	524	6	—	—	4	5	0·01	—	0·9	—
Federal Capital Territory	1	—	—	—	2·5	9	9·9	—	—	—
Commonwealth	2,975	33	1,669	3,805	5,435	6,750	2·2	114·0	14·0	22·4
Papua	91	1	—	—	—	275[1]	—	—	—	—
New Guinea	93	1	—	—	—	265[1]	—	—	—	—
New Zealand	105	$1\frac{1}{7}$	256	816	1,320	1,466[1]	14·2[1]	29·0	4·3	19·5

[1] 1933.

Animal products. The native land mammals, nearly all of which belong to the same peculiar group as the kangaroo (marsupials), yield furs of comparatively small value in the aggregate, and from a commercial point of view destroy a great deal more than they produce. The same is true of the dingo, or native dog, the only large native mammal that is not a marsupial. The most valuable of the introduced animals is the sheep, wool holding normally the first place in value among the objects of production in the Commonwealth. The wool production of Australia in general is treated of elsewhere (see p. 151), but here it may be added that no part of the world has shown itself better suited for the production of fine (merino) wool (see p. 149) than the treeless grassy plains with a saline soil bordering the Murray River and its tributaries in Victoria and New South Wales. As to frozen mutton and beef see p. 223, and as to rabbits see p. 222. A recent development is the export of *chilled* beef. Of recent years there has been a steady growth in dairying, with a corresponding development in the export of butter and cheese, bacon and eggs.

Cultivated crops. In the states of the mainland in which, as shown in the last column of the table given above, there was the greatest extent of land under cultivation, wheat is the chief crop. Till the end of last century South Australia was the chief wheat-growing part of Australia, but the movement for closer settlement has brought about a great increase in wheat cultivation in all the states extending into higher latitudes, and even before the War New South Wales had come to have the greatest area under this crop though not the highest production. The area under wheat in the Commonwealth increased from 9·3 million acres in 1913–14 to 12·5 million in 1915–16, but afterwards greatly declined. The lowest figure of recent years was reached in 1919–20 (6·4 million) since when there has been a steady recovery, the average acreage now being about 15 and the production 180 million bushels (5 million metric tons). New South Wales (a quarter to a third of the whole) leads in acreage and production. Oats, barley, and maize though important occupy but a fraction of the wheat acreage, but hay (for dairy cattle) covers a ninth of all the cultivated land.

The vine receives most attention in Victoria and South Australia. Sugar-cane is cultivated in Queensland and a variety has been found to succeed far beyond the tropics, and is grown even in the north-eastern valleys of New South Wales. The fruit-growing industry of the Commonwealth is now very important especially for apples in the cooler parts of Victoria and Tasmania, oranges in the warmer lands of Western Australia, South Australia, and the Murray basin.

The **mineral wealth** of the states already commercially available is enormous. Hitherto by far the most important of the mineral

treasures has been gold. It has been found more or less in all of them, but most abundantly in the three eastern states and Western Australia. Victoria stands first in respect of the amount of gold produced, having raised gold since its first discovery in the colony, in 1851, to the value of £306,000,000, or nearly half the total for the Commonwealth (£665,000,000). But with regard to this metal it is important to bear in mind that, on account of its great value, it is so eagerly searched for in districts known to be rich in it, that (in the case of alluvial gold) the amount yielded by any district soon begins to diminish. Hence the prosperity which a gold-field brings to a district is often only a passing prosperity. While the aggregate value of Australian wool increased fairly steadily till after 1890, that of gold soon reached its highest value and began to decline. After the early big production of the years between 1851 and 1860, there was a steady decline in the value of the gold won until the decade 1881–90. The next decade witnessed the remarkable series of discoveries in Western Australia, and that state in 1898 assumed her present leading position in production. The peak of Australia's production was reached in 1903, after which there was a continuous and somewhat rapid decline until 1930. The increased value of gold in terms of Australian currency led to a great resuscitation of mining in the years from 1931 onwards. The other minerals of commercial importance include copper in Queensland, Tasmania, South Australia and New South Wales; tin in all the eastern states and Tasmania; silver, lead, and zinc in New South Wales (Broken Hill District); silver and lead also in Queensland and Tasmania; and wolfram in Queensland. Ores of iron are present in large quantity in almost all the states, and some of the most important deposits are now utilised under government encouragement in the development of iron and steel industries. Of these the most important is the Iron Knob, a hill of iron ore, containing a high percentage of iron, situated about 40 miles W.S.W. of Port Augusta (South Australia) and smelted and worked up into iron and steel products at Newcastle (New South Wales). Coal, mainly from New South Wales, is now by far the most valuable mineral product of Australia. The annual output is now between 10,000,000 and 12,000,000 tons. By far the most important field is that of New South Wales—the largest coal basin in the Southern Hemisphere. The field is at present worked mainly near the outcrops—in the north at Newcastle, in the west at Lithgow, in the south at Illawarra. There is a large field in the Dawson River basin of Queensland and other smaller fields. Brown coal is specially important in Victoria where the Morwell deposits are worked at Yallourn and electricity is generated to supply Melbourne. The search for oil in Australia has met with no success. Amongst gemstones, Australia is famed for opals.

Commerce. On this matter the tables given below may be allowed very largely to speak for themselves. The marked advance in the trade of Australia with foreign countries as compared with a stationary or declining proportion of the trade carried on with the

AUSTRALIA

GENERAL IMPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.							
	'04–05	'06–10	'11–13	1924.	1926–30.	1931–35.	—	—
Raw materials:								
Petroleum	—	—	—	3·6	6·0	8·4		
Wood	3·0	3·7	4·2	3·8	3·0	1·7		
Paper & manfs.	2·6	2·5	2·5	4·5	5·3	7·2		
Tobacco	—	—	—	2·0	1·8	1·6		
Foods:								
Tea	2·1	2·1	1·7	2·4	2·7	3·1		
Manufactures:								
Machinery	5·9	5·8	6·0	8·4	10·3	7·8		
Cars	0·3	0·8	2·1	8·6	6·8	3·2		
Iron and steel	6·1	8·0	9·1	2·8	3·3	2·6		
Other metals and manufactures	—	—	—	8·6	7·4	5·8		
Silk or some silk goods					4·0	5·2		
Cotton goods	8·0	7·5	6·3	19·5	3·5	8·5		
Yarn and cordage					4·0	6·0		
Bags and sacks	—	—	—	1·9				
Chemicals	1·8	1·5	1·2	2·8	3·3	5·7		
Total £ millions	*37·7*	*51·5*	*75·0*	*140·6*	*147·6*	*58·3*		
Countries:								
United Kingdom	53·0	51·0	50·3	45·2	41·7	41·1		
United States	13·1	12·6	13·7	24·6	24·2	13·5		
Dutch East Indies	0·8	1·0	1·2	3·3	4·3	6·2		
India	3·7	4·0	3·4	3·4	4·1	5·7		
Japan	1·0	1·2	1·2	2·5	3·1	5·6		
Germany	7·9	8·8	9·1	1·0	2·8	3·2		
Canada	1·0	1·1	1·2	3·6	2·7	4·1		
France	3·5	3·4	3·0	2·9	2·5	2·0		
New Zealand	5·9	4·6	3·6	1·7	—	—		

Values in Australian pounds which was formerly equivalent to sterling. In 1935 £1 sterling = £1·25 Australian.

United Kingdom since the period 1881–85 is not to be wondered at, when it is considered that it is mainly since the beginning of that period that direct trade has been opened up with foreign countries. Direct trade with Germany began in 1879, with Belgium in 1881, with France in 1883. From 1887 till the eve of the Great War the North German Lloyd ran regular steamers to Australia ; and from

1888 a line of German cargo-boats connected the chief Australian wool-ports with Antwerp, Hamburg, and Dunkerque. A regular service is maintained between San Francisco and the Commonwealth, and Japanese and Norwegian vessels take an important part in the trade, the Norwegian, still frequently sailers, chartered for cargoes of wheat, coal, ores, and other bulky products.

AUSTRALIA

GENERAL EXPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.							
	'04–05	'06–10	'11–13	1924.	1926–30.	1931–35.	—	—
Raw materials :								
Wool . .	32·3	37·1	33·2	50·0	42·4	39·8		
Hides and skins	3·0	4·3	5·5	4·8	4·7	3·3		
Lead . .	1·5	1·6	1·9	3·0	2·7	2·5		
Foods :								
Wheat . .	8·3	8·5	10·1	12·4	12·3	15·1		
Wheat flour .	—	—	—	4·7	4·2	4·0		
Butter . .	4·2	4·3	4·9	4·4	5·0	9·2		
Meat . .	2·9	3·7	5·4	2·3	3·6	6·9		
Mutton & lamb	—	—	—	*1·0*	*1·5*	*3·2*		
Beef . .	—	—	—	*1·2*	*1·8*	*2·2*		
Sugar . .	—	—	—	—	2·7	2·1		
Fruits . .	—	—	—	—	2·3	4·3		
Bullion and coin	*27·6*	*17·4*	*12·8*	*53·0*	*7·7*	—		
Total £ million	—	—	—	*112·4*	*138·0*	*95·9*		
Countries :								
United Kingdom	47·5	47·6	42·8	38·1	41·1	48·9		
France . .	8·4	9·8	10·9	12·5	10·8	5·7		
Japan . .	1·0	1·7	1·4	9·7	7·5	9·7		
Germany . .	6·6	9·2	8·8	3·7	6·4	5·0		
Belgium . .	4·8	7·2	8·5	5·5	5·4	4·9		
United States .	2·9	3·8	2·6	6·0	5·8	2·3		
Italy. . .	—	—	—	3·9	3·2	3·2		
New Zealand .	2·7	3·4	3·1	4·2	2·9	2·9		
India . .	5·5	3·3	3·2	—	—	—		
Ceylon . .	9·6	3·2	6·0	—	—	—		

Throughout Australia there are uniform customs duties but trade between the states is free. In the last thirty years various efforts have been made to encourage inter-Imperial trade. A reciprocal customs tariff was in operation between Australia and South Africa from 1906 to 1926; similar agreements have been arranged with New Zealand, Canada, and other parts of the Empire. There has been a preferential tariff in favour of the United Kingdom since 1907, the Customs Tariff Act, 1933, gave effect to the 'Ottawa Agreement' of the preceding year increasing the preference. Trade

treaties have been arranged with Belgium, France, and Czechoslovakia.

All the states, and even the ports of the north-west coast of Western Australia, are now in regular steam communication with Europe. Different routes are followed, but most of the ships pass through the Suez Canal and along the south coast of Australia. Since 1872 Australia has been connected by telegraph with the rest of the world through the completion of the overland line which crosses the state of South Australia and the Northern Territory between Adelaide and Port Darwin and is there connected with a line which passes under the sea to the Dutch island of Java. The cable from Vancouver to Queensland and New Zealand by Fanning, Fiji, and Norfolk Islands was completed in November 1902. The first wireless station was erected in 1905 for demonstration purposes, and the first official stations opened for business in 1912. Direct beam wireless service with London was established in 1927 and with North America in 1928. International wireless telephone communication is now possible with 93 per cent. of the world's telephone subscribers (approximately 32,000,000 telephones).

Very extensive use is made of air routes in Australia. Many country doctors visit outlying settlers by plane; regular services for mail and passengers link centres not accessible by railway, and the 'major' subsidised services include Brisbane–Darwin–Singapore (connecting with Imperial Airways to London), Cloncurry–Normanton, Perth–Daly Waters (*via* the north-west coast towns), Cootamundra–Charleville, Melbourne–Hobart, Perth–Adelaide. There are many minor lines.

Victoria is the smallest of the states on the mainland of Australia. It occupies the extreme south-east, and is separated from the state of New South Wales mainly by the Murray River. The first permanent settlement on its territory was made towards the close of 1834. Till 1851 it formed a part of New South Wales. A large part of the surface is mountainous. The Australian Alps, with their spurs, fill the greater part of the eastern half of the state. West of these mountains the Dividing Range sinks in elevation, so that easy routes could be found for the railways laid north of Melbourne such as through the Kilmore Gap to the plains on the other side. The plains to the south of the Dividing Range (the Great Valley of Victoria), lying as they do on the moister side of the mountains, are well watered, in many places thickly covered with trees, and clothed with rich grasses, more suited for horses and cattle than for sheep. This is especially the character of Gippsland, the region to the south of the Australian Alps and where, south of the plains, rise the Gippsland Hills. This has become important dairying country. In the south-western portion of the State, known comprehensively as the Western District, there is much open level country where the rainfall is ample and sheep-

farming is carried on extensively. In parts the land is rich and given over to crops and dairying. North of the Dividing Range are the areas known as the Goulburn Valley, the Wimmera and, in the far north-west, the Mallee, where there is greater dearth of rain ; nevertheless, it is in this part of the state that the area under crops, especially wheat, has been greatly extended, since the decline of the gold-fields caused so many people formerly engaged in mining to take to farming. In the Goulburn Valley, where the soil is good, one of the chief industries is the growing of fruit—mainly peaches and apricots for canning, and grapes. Various crops, including a great deal of wheat, are also grown, while dairying is an important industry.

The Wimmera is largely devoted to wheat-growing and sheep-farming. The Mallee, which was covered originally by the mallee scrub (*Eucalyptus dumosa*), brittle-stemmed trees growing to a height of from 12 to 20 feet, has been settled in comparatively recent years. The soil there is sandy and well suited to the production of wheat, although the rainfall is unreliable and in some years yields are low.

A feature of primary production in Victoria is the extensive and efficient provision made for water supplies in those districts where Nature has been less generous in the matter of rainfall. Huge irrigation systems, involving the construction of storages to hold 2,310,000 acre-feet, or 627,000,000,000 gallons of water have been completed and more than 13,000 miles of channels have been constructed to carry this water which has made great areas fruitful with mile on mile of orchards, many of which are devoted to the production of dried and canning fruits.

Large areas of pasture, lucerne and other fodder crops are grown under irrigation in settlements devoted largely to dairying and the raising of fat lambs. Water is carried also to the Wimmera and Mallee for domestic and stock purposes.

Tobacco and broom millet are grown in the north-eastern part of the state. Sugar-beet is also cultivated in Victoria at Maffra, 130 miles from Melbourne in Gippsland. Brown coal is being mined in rapidly increasing quantity (see p. 807).

The capital and chief seaport is Melbourne, situated on the Yarra, a short distance above its mouth in Port Phillip Bay. The Yarra is navigable up to the city by vessels of considerable size, including all those engaged solely in the coastal trade; but the harbour of Melbourne for the larger ocean steamers is formed by Hobson's Bay, the upper part of Port Phillip. Port Phillip itself is a shallow sheet of water, which affords a large extent of safe anchorage, but has a narrow and difficult entrance. On a western arm of this bay stands the port of Geelong, a town that has long carried on the manufacture of woollen tweeds, &c., which are supplied to all the Australian states. In the interior, north-west of Melbourne, is Ballarat, the centre of the richest alluvial gold-field

ever opened up, but which is now to a large extent exhausted, gold being now mainly obtained not by digging but by the crushing of quartz-rock. In a more northerly direction from Melbourne lies Bendigo (Sandhurst), the old centre of quartz-crushing. On the Murray, Wodonga, opposite the New South Wales town of Albury, is at the head of the ordinary navigation, where the river is crossed by the railway to Sydney; lower down is Echuca, at the place where the river makes a sharp bend to the north-west, and where another railway now crosses into New South Wales, and near which extensive tracts are irrigated from the Goulburn Weir and Lodden River works.

New South Wales was so called by Captain Cook, who was reminded of the Wales of Great Britain by the appearance of the mountains which he saw from off the coast. It was in this state that the first settlement was founded in Australia, namely, on the magnificent natural harbour of Port Jackson, the harbour of Sydney, which has few rivals in the world for either beauty or convenience. Throughout the state the Dividing Range forms a more continuous barrier between the coast lowlands and the interior plains and tablelands than it does in Victoria, and it was long before the settlers found a way across the Blue Mountains, as the part of the Dividing Range behind Sydney is called. The route at last found in this quarter is now traversed by a railway, which finally pierces the mountains in a tunnel 3,700 feet above sea-level. Formerly the line descended on the west side in numerous zigzags, but these were avoided by the opening of an easier route in 1910, and three years later similar improvements were made on the east side, reducing considerably the cost of working the traffic. Further north the New England Range, trending north and south (crossed by rail, on Ben Lomond, at a height of 4,473 feet), and the Liverpool Range, trending east and west, shut off the part of the tableland known as the Liverpool Plains, which contain the headwaters of the Namoi, or Peel River, one of the tributaries of the Darling. It is in New South Wales that the steepest railway gradients in Australia occur. In that state 152½ miles have a gradient at least as steep as 1 in 40, 350 miles in all up to 1 in 50. The interior of New South Wales generally is traversed by the chief tributaries of the Murray, and the treeless plains noted for their wool lying to the north of that river are hence known as the Riverina. The population of New South Wales increased at a much more rapid rate than that of Victoria, which it now exceeds by about a million. It is, however, much more widely distributed over the surface, so that there is no part of New South Wales where the railways are so thickly crowded together as they are in part of Victoria. The reason of this is that the mineral treasures of the state are more widely distributed, and the population engaged in agriculture is similarly scattered over the large area of the interior plains where wheat and sheep farming are possible. Some of the coast strip is rather sterile, but south of Sydney is much

dairying, and northwards, along the line of the post-War Brisbane to Sydney coast railway, are lands wet enough and warm enough for sugar cane, and there is much dairy farming.

Lord Howe Island, lying to the north-east of Sydney, is a dependency of New South Wales. Norfolk Island, nearer New Zealand, is administered by the Commonwealth. They both contain a small number of inhabitants, grow fruits and are popular tourist resorts. Production of Kintia Palm seeds is, however, the chief industry of Lord Howe Island.

The capital of the state and chief seaport of New South Wales is Sydney, on Port Jackson. With a population of a million and a quarter, Sydney has almost half the population of the state. The residential suburbs are scattered round the shores of the harbour, and Sydney has been linked since 1932 with North Sydney across an arm of the harbour by the longest single-arch bridge in the world, costing over £10,000,000. At the head of the so-called Parramatta River, which is in reality a prolongation of the inlet of Port Jackson, stands Parramatta, in a district noted for its oranges. North of Sydney, on the estuary of the Hunter River, stands Newcastle, the chief coal-mining town and place of export of coal. The coal is now exported not only to all the other Australian states, but also to foreign countries. Newcastle is the centre of important manufacturing industries—iron, steel, and engineering. Another important coal-port is Wollongong, to the south of Sydney, the port of the Illawarra coal-field. In this district Port Kembla is rapidly developing into a leading manufacturing city—with iron, steel, and metal refining works. Bathurst, on the tableland behind Sydney, is the centre of the chief wheat-growing district of the state ; Deniliquin, that of the pastures of the Riverina, and the starting-place of the railway by which the wool of that district is despatched for export to Melbourne (not to Sydney) ; Broken Hill and Silverton, near the western frontier, are the chief towns of the Barrier Range, a silver-lead-zinc yielding area, amongst the richest in the world. The water-supply of the silver-mining district was at first a difficulty, but is now obtained from local rivers. Most of the ore is conveyed to Port Pirie in South Australia, for smelting purposes, though the district is now accessible by rail from Sydney. A portion of the zinc concentrates produced is treated at Risdon, Tasmania, and the balance exported overseas.

Queensland, the state to the north of New South Wales, was once, like Victoria, a dependency of New South Wales, from which it was separated in 1859. It includes all the islands in the narrowest part of Torres Strait. The surface consists mainly of land above 1,000 feet in height, and the district in the south-east known as the Darling Downs, on which are the finest pasture grasses in the state, is about 2,000 feet high, and thus has a comparatively cool climate for its situation, within five degrees of the Tropic of Capricorn.

Extending far into the tropics, Queensland has more varied products than the more southern states. Among the tropical and subtropical products are cotton, bananas, pineapples, and melons, but at present the chief is sugar-cane, which is largely grown in the low river valleys on the coast. The yield of unginned cotton increased from 27,000 lbs. in 1919 to 16,000,000 lbs. in 1925 and, despite fluctuations, reached 27,000,000 lbs. in 1934 and 21,000,000 lbs. in 1935. The output of raw sugar is over 600,000 tons. In the warmer, wetter parts of Queensland maize is the chief grain, wheat on the cooler lands.

Queensland is the most important cattle-raising state in the Commonwealth, and possesses large areas of the finest grazing lands in the Empire, with room for vast expansion in the production of chilled and frozen beef for export purposes. The wool industry is the most valuable of all the state's activities, practically the whole output being of fine merino wools. The state had, in 1936, 18,060,000 sheep and 6,033,000 cattle.

Gold is found in many places, but most abundantly at Mount Morgan. Other famous fields include Charters Towers and Gympie. Tin is found in several widely separated districts. One of these is on the tableland in the extreme south of the state, in a district adjoining the New South Wales tin-field, the centre of this district being Stanthorpe. Another, which is the more productive, is round Herberton near the east coast, in about 17½° S. lat. A very rich copper district lies round Cloncurry, in the north-west of the state, to the south of the Gulf of Carpentaria, and in January 1908 this was connected by rail with Townsville. Another rich copper-field is Chillagoe. More than 2,000,000 ozs. of silver and 42,000 tons of lead were produced at Mount Isa in 1934. Besides metals, Queensland is very rich in coal, but it has not, like New South Wales, a coal-field accessible to ocean-going vessels. The chief collieries are in the basin of the Brisbane and Bremer rivers, others are those of Wide Bay and Maryborough, Darling Downs, Rockhampton, and Bowen districts.

The capital of the state is Brisbane, 500 miles north of Sydney, situated on both sides of the Brisbane River, at the head of navigation for large sea-going vessels. Toowoomba, on the tableland to the west of Brisbane, is the chief town on the Darling Downs. Rockhampton, close to the Tropic of Capricorn, at the head of navigation of the Fitzroy River, is the second town in population in the state and the outlet for a rich and extensive pastoral district as well as for districts producing gold and copper. Townsville is the outlet for several large mining fields, including that of Cloncurry, and also for a large area of pastoral country, so that it has become an important seaport. Brisbane, Rockhampton, and Townsville are the starting-points of three lines of railway which have been laid westwards for a distance of from 400 to 600 miles into the better

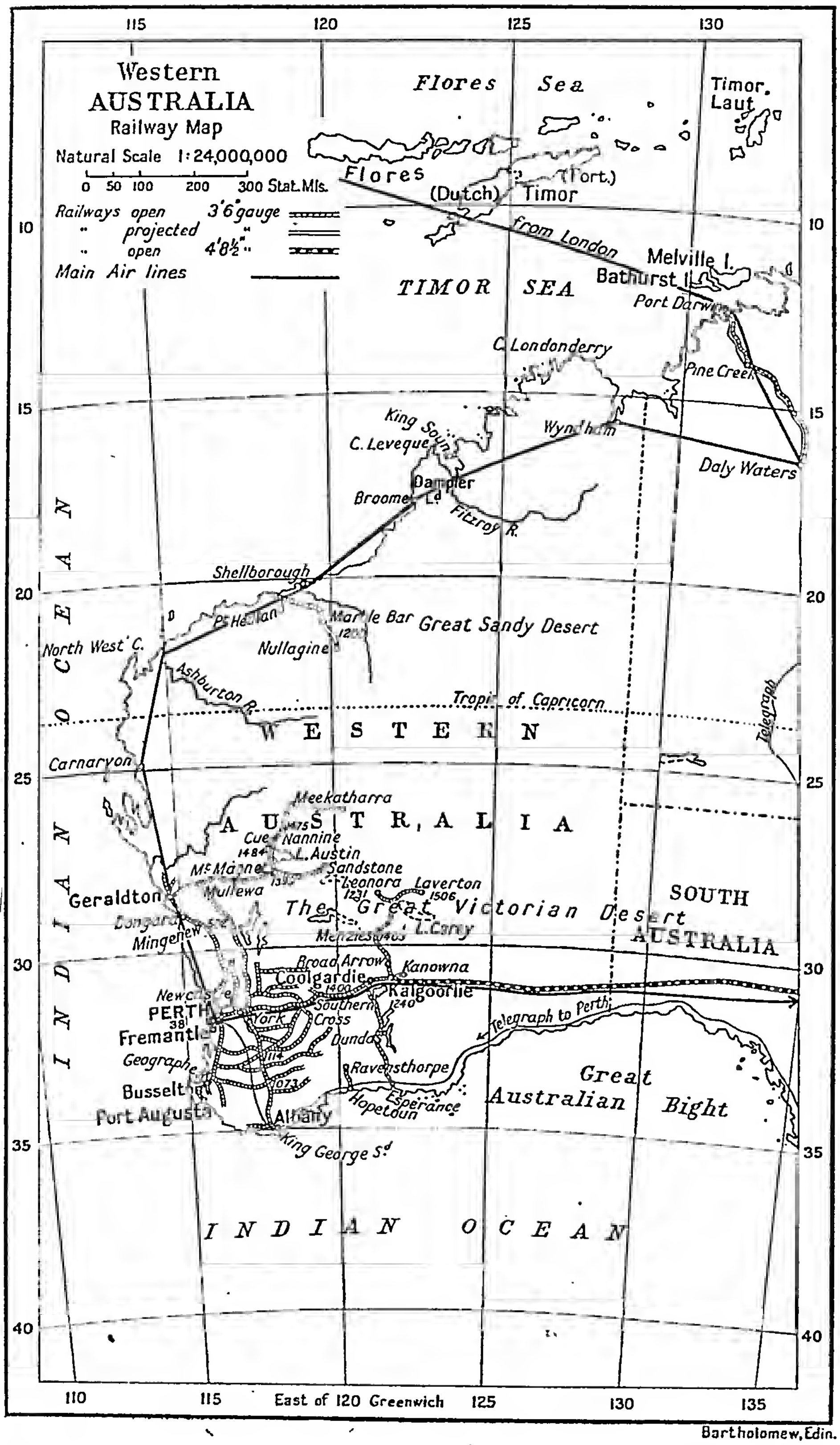
parts of the tableland. The harbours of Bowen and Gladstone are naturally two of the best on the coast. The coast towns as far north as Cairns are linked with Brisbane by rail and it has long been planned to join Darwin with Cloncurry and so with the whole Australian system.

South Australia does not answer to its name, though the name is somewhat more appropriate since the separation of the Northern Territory. It was founded in 1834 by an Act of the British Parliament, and was then expected ultimately to include the territory belonging to Victoria. Most of the inhabitants of the state are confined to a district about the size of England, chiefly the part of the state that receives a minimum of 10 inches of rain per annum, chiefly in winter. This district lies mainly to the east and west of Spencer Gulf and the Gulf of St. Vincent, where it is traversed by the Mount Lofty Range and the Flinders Range of mountains. Among agricultural products wheat is the most important. The sheltered slopes of the Mount Lofty range are well suited to the vine and the state produces three-quarters of Australia's wine. From an early date copper was its chief mineral, but the excellent iron ore obtained from Iron Knob is now the most valuable. Irrigation is practised in the drier parts of the state, especially in the lower part of the Murray basin. At Renmark similar irrigation works to those of Mildura in Victoria have been carried out, and there is a large production of fruit (for sale fresh, for canning and drying). The extension of sheep runs—the production of wool is of great importance—and stock rearing has been made possible over some of the drier areas by the use of water, for watering the animals, from artesian wells. The north-east of the state lies in the Great Basin. The land round Lake Eyre (38 feet below sea-level) is the lowest-lying part of Australia. Most of this 'lake' is now dry except for swamps at the southern end. Further north the telegraph line passes through many well-grassed regions which may some day be settled, and other grassy tracts are now known to border some of the river courses of this region. Little settlement, however, resulted from the construction of the railway to Oodnadatta. In 1931 this line was extended to the more promising grassland around Stuart (Alice Springs) in the Northern Territory.

The capital of the state is Adelaide, situated near the east side of the Gulf of St. Vincent. It was founded in 1837 and named after the queen-consort of William IV and laid out on spacious lines which embody many of the principles of modern town-planning. About seven miles from the city stands Port Adelaide, on a small inlet opening out of the Gulf of St. Vincent. An outer harbour with a depth of 30 feet, opened at this port in January 1908, first provided accommodation for large ocean steamers. From the completion, in 1887, of the series of railways from Adelaide to Melbourne and Sydney, the port of Adelaide became the place

at which all the mails were collected and landed by vessels following the south coast route ; but was displaced by Fremantle after the opening of the trans-continental line from Port Augusta in South Australia to Kalgoorlie in Western Australia, a line which, along with various state lines, completes a through rail connection between Brisbane on the east and Fremantle on the west. Much of the mail landed at Fremantle is now taken by air to the eastern states, while the direct air mail from Europe comes *via* Darwin. Burra Burra, about one hundred miles north of Adelaide, was the seat of the chief inland copper-mines, but the principal copper-mines in the colony were those of Moonta, on the peninsula between Spencer and St. Vincent Gulfs. As to Iron Knob, see p. 807. Port Augusta is a wheat-port at the head, Port Pirie another on the east side, of Spencer Gulf, and Port Lincoln a third, near the south end of Eyre's Peninsula.

Western Australia is the largest but the least populous of the older states. The vast deserts belonging to it will always cause it to be more imposing in extent than population, and even in the principal settled area, the district in the south-west, which receives autumn and winter rains brought by the north-west winds, corresponding to the south-west winds of western Europe, the population is still sparse. This is largely owing to the character of the country. Though there is much good soil, the fertile districts are scattered, and the best land for European settlers is far from what was, till the construction of the excellent harbour of Fremantle, the only good harbour of the settled district, that of King George's Sound. After the development of the gold-fields, however, population rapidly increased, and all the industries for which the state offers advantages, including agriculture, have been stimulated. Thus the wheat acreage increased from 34,000 in 1890–91 to 1,700,000 in 1915–16—a War-time maximum. It is now normally over 3,000,000. Fine hard timber from the moist south-west has always been an important product of this state. The most productive gold-fields are those of Kalgoorlie in about 31° S., but so far in the interior that the industry was long greatly hindered by the lack of water. A plentiful supply has, since January 1903, been pumped from a reservoir about 25 miles from Perth at a distance of 350 miles from Kalgoorlie. Before the discovery of the Coolgardie gold-field in 1891 the population of Western Australia did not exceed 50,000. The Murchison gold-field, of which the chief centre is Cue, lies in about 27½° S. In the south-west of the state on the Collie River are important deposits of coal, which is exported from Bunbury, a place of export also for the hard timber of the state. In the northern parts of Western Australia pearl-fisheries are carried on along the coast, but this industry was threatened by the legislation of the Australian Commonwealth against the employment of


Western
AUSTRALIA
Railway Map
Natural Scale 1:24,000,000
0 50 100 200 300 Stat. Mls.
Railways open 3'6" gauge
" projected "
" open 4'8½" "
Main Air lines
Flores Sea
Timor Laut
Flores
(Dutch) Timor
(Port.)
from London
TIMOR SEA
Melville I.
Bathurst I.
Port Darwin
C. Londonderry
Pine Creek
King Sd.
C. Leveque
Wyndham
Daly Waters
Dampier Ld.
Broome
Fitzroy R.
Shellborough
Pt. Hedland
Marble Bar
Great Sandy Desert
North West C.
Nullagine
Ashburton R.
Tropic of Capricorn
W E S T E R N
Telegraph
Carnarvon
Meekatharra
A U S T R A L I A
Cue
Nannine
L. Austin
Sandstone
Leonora
Laverton
Geraldton
Mullewa
The Great Victorian Desert
SOUTH AUSTRALIA
Mingenew
L. Carey
Broad Arrow
Kanowna
Coolgardie
Kalgoorlie
PERTH
Fremantle
York
Southern Cross
Dundas
Telegraph to Perth
Geographe
Busselton
Ravensthorpe
Great Australian Bight
Port Augusta
Albany
Hopetoun
Esperance
King George Sd.
INDIAN OCEAN
I N D I A N O C E A N
East of 120 Greenwich
Bartholomew, Edin.

coloured labour. The Royal Commissioners, however, in their 1916 report, did not think it advisable or profitable to transfer the industry from Asiatics to Europeans. Gold also exists in the interior of this part of Western Australia, and good pasture-lands have attracted settlers. The chief pastures are in Kimberley District, along the banks of the Fitzroy River, which flows into King Sound, about $17\frac{1}{2}°$ S. This is cattle-ranch country but development is hampered by lack of communications. The cattle deteriorate greatly as they are driven on foot great distances to the ports. The capital of the state is Perth, on the Swan River, about twelve miles above its port, Fremantle, on the west coast. Albany, on King George's Sound, 260 miles distant from Perth, is the place where the first settlement was made on West Australian territory (in 1826).

Tasmania. This state consists of the island so called, together with the smaller islands adjacent. It is separated from Victoria by Bass Strait. Like Victoria and Queensland, the state was originally a dependency of New South Wales, and the first settlement upon it was a convict establishment formed in 1803, but it was made independent in 1825. The surface of the main island is in great part high. A bleak tableland, from 2,000 to 3,000 feet in height, occupies the middle and a large part of the western half of the island, and is crowned by mountains, and cleft by deep chasms through which issue the torrents which come to form the rivers of the west coast. To the east of this tableland lies a tolerably level and open district, which forms the great grazing-ground of the state. Elsewhere the colonists have had to contend with land more or less heavily timbered. The climate is somewhat warmer than that of England, very suitable for all English crops, and specially well adapted for fruits. Copper (at Mount Lyell in the west), silver-lead (at Mount Zeehan), tin (at Mount Bischoff in the north-west and elsewhere), and gold are important minerals, and coal-mines and oil-shale (the latter near Latrobe in the north) are also worked. The capital is Hobart, at the end of the island furthest from Australia, an inconvenience which is, however, outweighed by the excellence of its harbour, formed by the estuary of the Derwent. The electric power that is available has enabled several important industries to be worked such as carbide manufacture, woollen goods, &c. One of the largest electrolytic zinc treatment works in the world, at Risdon, near Hobart, treats ores sent there from other states on the mainland in addition to those from Tasmania itself. These ores, being zinc-blende, contain sulphur which is used in the manufacture of sulphuric acid, and that again in converting Nauru phosphates into superphosphates. The waters of the Great Lake and other catchment areas on the Central Plateau, are used for generating power. Launceston is at the head of navigation on the Tamar, forty miles from the mouth of the estuary known as Port Dalrymple, on the

side nearest to Australia. A deep-water port has been formed at Bell Bay on the Tamar.

The Northern Territory of Australia, embracing more than half a million square miles, was separated from South Australia and transferred to the Commonwealth on January 1, 1911. In 1927 the Northern Territory was divided into North Australia (centre at Darwin) and Central Australia (centre Stuart or Alice Springs), but from 1931 the whole was placed again under one administrator. Its southern limit being lat. 26° S., by far the greater part of the area lies within the torrid zone. It is only in the peninsular portion to the north that there is a copious rainfall—40 inches and upwards per annum, occurring, of course, almost entirely in summer, so that conditions here resemble the 'monsoon lands' of Peninsular India. Towards the interior, here as elsewhere in Australia, the precipitation becomes very scanty, the area with as much as 20 inches of rain annually not apparently extending beyond 18° S. The part with copious rains would be well adapted for the growth of all the vegetable products of the tropics, but could not be turned to account for that purpose in the manner in which such regions are exploited elsewhere by whites without coloured labourers. The live-stock industry is at present the only one of any importance, cattle being, as in the corresponding latitude of Queensland, the animals most largely reared. Towards the south of the Territory are some well-grassed stretches, suitable for sheep, bordering the Finke and other rivers descending from the Macdonnell Ranges (on the Tropic of Capricorn) now accessible from railhead at Stuart. The capital is Darwin, and the only railway in the territory is one of about 316 miles running thence to Birdum about 60 miles north of Daly Waters. When the long-projected scheme to link this line with the southern extension at Stuart will be completed is doubtful; it may rather be linked with the Queensland system (see above, p. 814). During the War meat-preserving works were erected near Darwin, but the cattle-rearers find it easier to send their stock overland to Queensland or to Wyndham in Western Australia. The maximum population, exclusive of an unknown number of aborigines, was that of 1888, when it was little more than 7,500. It is now about 4,000.

TOWNS OF AUSTRALIA, 1934

Sydney	1,249,000	Hobart	62,000
Melbourne	1,000,000	Geelong	39,000
Adelaide	315,000	Launceston	33,000
Brisbane	305,000	Rockhampton	30,000
Perth	208,000	Fremantle	25,000
Newcastle	106,000		

DOMINION OF NEW ZEALAND

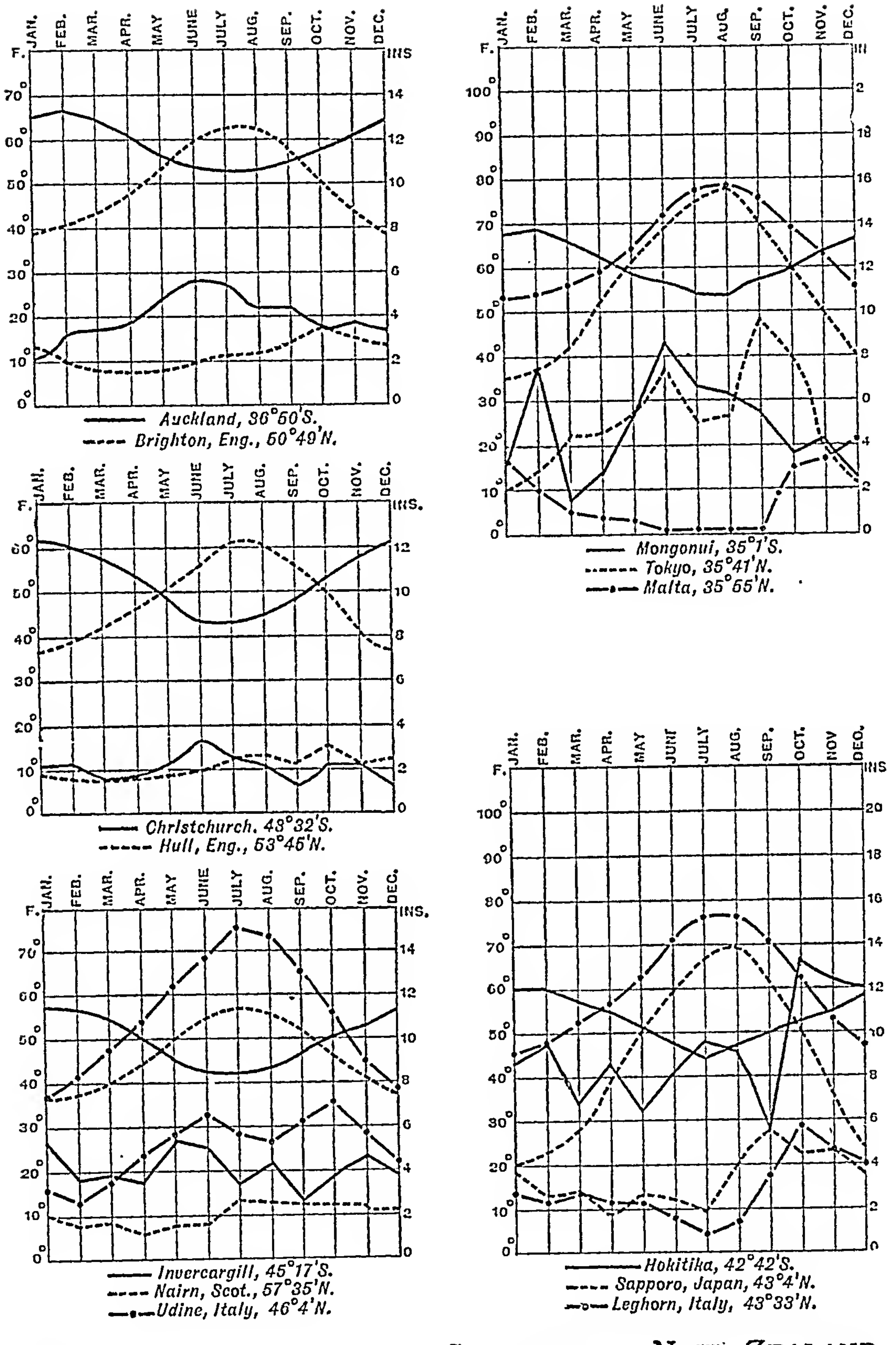
New Zealand, a colony first settled in 1840, and proclaimed a Dominion in September 1907, consists mainly of two large islands and one smaller one, situated at the distance of about 1,000 miles from the nearest points of the south-east coast of Australia. The large islands are usually known as the North and the South Island (frequently called the Middle Island), and are separated from each other by Cook Strait. The smaller island is called Stewart Island, and is separated from the South Island by Foveaux Strait. Besides the main islands just mentioned, New Zealand possesses several groups of small islands in the Pacific Ocean. The principal are the Chatham Islands to the east, the Auckland Islands to the south, the fertile group of the Kermadec Islands to the north-east, the important Cook Islands (annexed to New Zealand in 1901), Niue (1901), and the Union Islands (1926). New Zealand is also responsible for the administration of Ross Dependency, a sector of the Antarctic Continent. The coast-line of New Zealand is in most places high and rocky, especially on the west coast. In the extreme south-west it is broken up by numerous inlets with very steep and lofty cliffy shores, resembling the fiords of Norway.

The surface of all the islands is highly mountainous. One long succession of mountains runs through both islands from the south-west to the north-east. In the South Island these mountains lie for the most part close by the west coast, and it is about the middle of this island that the highest parts of the whole series are found. These parts are called the Southern Alps, and, like the Alps of Europe, they are crowned by perpetual snow, and have their higher valleys filled with large glaciers, their lower valleys occupied by large and picturesque lakes. So difficult are these mountains to cross, that for more than a hundred miles there is no road connecting the east and west coasts of the South Island. The West Coast Road between Christchurch and Hokitika passed through a difficult defile known as the Otira Gorge, and across Arthur's Pass, more than 3,000 feet high, but this road has, since 1923, been largely replaced by a railway with gradients of 1 in 33 passing under Arthur's Pass in a tunnel (the Otira or Arthur's Pass Tunnel) 5·3 miles long, rising from 1,585 feet at its western to 2,435 feet at its eastern end.

The most extensive plains in New Zealand are those called the Canterbury Plains, which occupy the middle of the South Island on the eastern side, extending for upwards of a hundred miles from north to south, with a varying breadth.

The rivers of New Zealand are numerous, but the longer ones are for the most part unfit for navigation. Those of the South Island are mostly rapid torrents, fed in summer by the melting snows and glaciers of the Southern Alps. The chief navigable river is the Waikato, which drains Lake Taupo, and enters the sea on the west of the North Island. The Molyneux, or Clutha, a noble stream, draining south-eastwards three of the chief lakes at the base of the Southern Alps, is the largest river of the South Island.

The climate of New Zealand is not characterised by the liability to droughts from which so much of Australia suffers. The winds that carry the most plentiful rains blow from the north-west, as in the south-west of Australia, so that the western slopes of the mountains and the plains at their base are plentifully supplied with rain, whereas the plains on the east have a much more scanty rainfall. Hence the forests are chiefly on the west side of the mountains, and the Canterbury Plains are the chief pastoral and agricultural region in the Dominion. On this side also are the principal advantages for water-power development, to promote which the Dominion passed an Act in 1910. The principal installations carried out under this act are the Lake Coleridge station, in the Southern Alps, 65 miles west of Christchurch, the works including the diversion of the Harper River into the lake to increase the power; the Waikato River works supplying Hamilton and district, and the Mangahoe scheme supplying Wellington. It is estimated that 4,750,000 h.p. could be developed—nearly 20 times that used at present. The temperature, especially in summer, resembles that of England more than that of Italy, with which New Zealand corresponds in latitude. (See diagrams, overleaf.) The New Zealand crops, therefore, are similar to those of England (the chief corn crops, wheat, and oats), and though grapes are grown in the open air in the northern districts, wine is rarely made from them. The high average yield of wheat in New Zealand is shown on p. 121. The more abundant rain of New Zealand causes the pastures to be richer than those of Australia, and English cultivated grasses thrive remarkably well. Indeed, the area under sown grasses is eight times that of all crops combined. New Zealand consequently supplies New South Wales with considerable numbers of horses and cattle. A further interesting illustration of the resemblance between the climate of New Zealand and that of England is presented by the success with which the Lincoln, Leicester, and other breeds of English sheep yielding long, strong, and lustrous wools are reared on the New Zealand pastures. As to the trade in mutton,



METEOROLOGICAL DATA OF STATIONS IN NEW ZEALAND, compared with data for stations (a) in Great Britain, (b) others in corresponding latitudes in the Northern Hemisphere.

Mean temperature curves above, rainfall below.

Degrees F. numbered on left, inches of rainfall on right.

NEW ZEALAND

GENERAL IMPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions[1] Sterling. '91–95	'01–05	'06–10	'11–13	'24–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'24–29
1. Iron manufactures	0·45	1·08	1·41	1·79	2·21	6·8	8·6	8·5	8·5	4·6
2. Machinery	0·19	0·72	0·87	1·15	4·25	2·8	5·8	5·2	5·5	7·8
3. Apparel	0·33	0·56	0·76	1·12	2·72	4·9	4·5	4·6	5·4	5·6
4. Cotton piece goods	0·38	0·52	0·75	0·93	—	5·6	4·2	4·5	4·5	—
5. Sugar	0·38	0·45	0·56	0·76	1·15	5·7	3·6	3·4	3·6	2·4
6. Drapery	0·32	0·48	0·55	0·56	4·46	4·8	3·9	3·3	2·7	8·9
7. Paper and stationery	—	0·35	0·47	0·59	1·46	—	2·8	2·8	2·8	3·1
8. Tobacco and manufrs.	0·13	0·25	0·37	0·46	1·62	1·9	2·0	2·3	2·2	3·4
9. Drugs and chemicals	0·12	0·26	0·37	0·43	1·20	1·7	2·1	2·2	2·1	2·5
11. Woollen piece goods	0·18	0·39	0·33	0·35	—	2·7	3·1	2·0	1·7	—
12. Fruit	0·13	0·21	0·30	0·35	0·83	1·9	1·7	1·8	1·7	1·7
13. Boots and shoes	0·14	0·24	0·27	0·35	1·06	2·1	1·9	1·7	1·6	2·2
14. Tea	0·15	0·22	0·26	0·32	0·92	2·3	1·7	1·6	1·5	1·9
25. Motor vehicles	—	0·04	0·19	0·79	4·88	—	0·3	1·1	3·8	10·1
Average total value	6·71	12·41	16·51	20·91	48·19					

Principal Countries.	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'24–29
1. United Kingdom	64·3	59·7	59·9	59·9	50·2
2. Australia	19·5	15·4	16·4	13·4	10·0
3. United States	5·7	11·5	8·5	9·3	17·6
4. Fiji	2·8	3·4	3·3	3·7	1·5
5. India	2·7	2·4	2·2	1·9	1·6
6. Germany	1·1	2·0	2·2	2·9	0·8
7. Canada	0·1	0·6	1·3	1·8	7·6
8. Ceylon	0·7	1·2	1·3	1·3	1·8
9. Belgium	0·2	0·8	0·6	0·8	0·7
10. France	0·2	0·4	0·6	0·7	0·8
11. Japan	0·2	0·6	0·6	0·7	1·2
12. Java	—	0·2	0·4	0·4	2·0[2]

GENERAL EXPORTS, INCLUDING BULLION AND SPECIE

Principal Articles.	Average Value in Millions[1] Sterling. '91–95	'01–05	'06–10	'11–13	'24–29	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'24–29
1. Raw wool	4·14	4·23	6·87	7·22	14·33	45·1	29·4	35·7	33·9	27·4
2. Frozen or chilled meat	1·15	2·73	3·39	3·95	11·66	12·6	19·0	17·6	18·6	22·2
3. Gold;bullion	0·99	1·97	2·04	1·52	0·71	10·7	13·7	10·6	7·2	1·4
4. Butter	0·22	1·24	1·56	1·91	11·01	2·4	8·6	8·1	9·0	20·9
5. Skins and hides	0·29	0·51	0·95	1·02	2·28	3·2	3·6	4·9	4·8	4·4
6. Cheese	0·11	0·20	0·82	1·55	6·34	1·2	1·4	4·2	7·3	12·1
7 Tallow, oleo-margarine	0·20	0·43	0·58	0·65	0·78	2·2	3·0	3·0	3·1	1·5
8. Flax (Phormium)	0·16	0·55	0·55	0·47	0·49	1·8	3·8	2·9	2·2	0·9
9. Kauri gum	0·46	0·72	0·50	0·43	0·33	5·0	5·0	2·6	2·1	0·6
10. Timber	0·13	0·27	0·35	0·42	0·46	1·4	1·8	1·8	2·0	0·9
11. Coal (incl. bunker coal)	0·09	0·14	0·15	0·21	—	1·0	1·0	0·8	1·0	—
12. Oats	0·24	0·47	0·14	0·17	—	2·6	3·3	0·7	0·8	—
13. Meat, potted, &c.	0·07	0·09	0·11	0·12	0·84	0·8	0·6	0·6	0·6	1·6
Average total value	9·17	14·39	19·26	21·26	52·24					

Principal Countries.	Percentages of Total Value. '91–95	'01–05	'06–10	'11–13	'24–29
1. United Kingdom	79·8	75·1	81·5	78·6	76·5
2. Australia	13·6	15·3	11·6	12·0	5·7
3. United States	4·7	4·2	3·0	3·1	7·0
4. Pacific Islands (for.)	—	0·7	0·8	0·7	—
5. Ceylon	—	—	0·6	0·3	—
6. Canada	—	0·1	0·5	2·1	3·0
7. Germany	0·1	0·1	0·5	1·2	2·1
8. Union of South Africa	—	3·3	0·4	0·3	0·1
9. Fiji	0·5	0·4	0·4	0·1	0·2
10. France	0·1	0·1	0·2	0·5	2·0

[1] F.o.b. prices in countries of origin + 10 per cent.

[2] Dutch East Indies 1926–29.

see p. 223. The minerals of New Zealand are of great value, th chief being gold and coal. Kauri-gum, the fossilised resin of forme kauri forests, was formerly of considerable value.

The natives of New Zealand, called the Maori, are the most intelligent of all the natives whom the Europeans met with in

NEW ZEALAND

GENERAL IMPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.[1]	—	—
Foodstuffs	—	*12·2*	*14·6*		
Sugar	3·3	2·3	2·3		
Tea	1·9	1·9	1·9		
Fruits	1·6	1·8	2·5		
Raw materials	—	*14·3*	*15·4*		
Tobacco and cigarettes	3·4	3·2	2·2		
Petroleum and oils	6·4	6·5	7·1		
Fertilisers	—	1·4	1·8		
Manufactures	—	*73·5*	*69·1*		
Textiles	9·4	9·1	13·6		
Cotton goods	—	*4·2*	—		
Woollen goods	—	*1·6*	—		
Silk goods	—	*2·1*	*2·7*		
Apparel	5·5	8·1	7·6		
Cars	9·4	6·7	7·6		
Machinery	7·3	8·2	7·9		
Paper and books	3·0	4·4	5·9		
Iron and steel	4·9	4·6	4·9		
Rubber tyres and tubes	—	2·2	—		
Chemicals and drugs	2·4	2·6	4·5		
Total value in million £.	*48·5*	*46·2*	*28·2*		
Countries:					
United Kingdom	51·1	46·9	50·7		
United States	15·6	18·5	13·4		
Australia	13·0	8·0	9·8		
Canada	8·2	7·8	6·6		
Dutch East Indies	—	2·0	3·8		
Japan	0·6	1·3	2·2		

[1] Classes 1931–33 only.

New Zealand currency was formerly the same as sterling. In 1935 £1 sterling = £1·24 New Zealand.

Australasia. They are a brown-skinned, well-formed people, fond of tattooing themselves. Most of them live on the North Island. Their number, formerly decreasing, has now begun to increase and is now about 70,000.

The capital of the Dominion is Wellington, in the south of the North Island on an inlet from Cook Strait, forming a safe and

commodious harbour (Port Nicholson) with depths alongside the wharves of from 16 to 41 feet. It is about 1,270 miles from Sydney. Auckland, on a narrow isthmus of the long peninsula of the North Island which runs to the north-west, was once the seat of government. It is a calling-station for steamers from San Francisco and the Panama Canal to Sydney, and as it lies on the east side of the isthmus (the west side having only a shallow harbour), vessels from Auckland bound for Sydney have to sail round the northern end of the island. In the South Island the chief towns are Christchurch

NEW ZEALAND

GENERAL EXPORTS (INCLUDING BULLION AND SPECIE)

—	Percentages of Total Value.				
	1924.	1926–30.	1931–35.[1]	—	—
Raw materials	—	*39·0*	*24·7*		
Wool	29·4	26·2	18·6		
Skins and hides	5·4	6·3	3·3		
Foodstuffs	—	*58·4*	*69·5*		
Butter	22·4	22·6	28·3		
Frozen meat	18·3	19·8	25·5		
Cheese	13·5	12·7	11·7		
Tallow	1·5	1·5	1·2		
Manufactures	—	*1·0*	*1·2*		
Gold bullion	*1·1*	*1·1*	*2·8*		
Total value in £ millions	*51·9*	*49·0*	*40·5*		
Countries:					
United Kingdom	79·9	76·7	85·8		
United States	6·2	6·5	3·0		
Australia	4·8	4·9	3·4		
Canada	1·4	4·4	1·1		

[1] Classes 1931–3 only.

and Dunedin. Christchurch is the principal town on the Canterbury Plains. It is situated a few miles from the east coast, and separated by a tunnelled hill from its port, Lyttelton, situated on one of the inlets of Banks Peninsula. Dunedin stands at the head of an inlet farther south, in the old province of Otago, and is the port of the 'Otago Plateau.' Large ocean-vessels have to stop at Port Chalmers, at the mouth of the inlet. Invercargill is the chief town on Foveaux Strait; its port, for large vessels, is Bluff Harbour. Greymouth and Westport are the ports of the principal New Zealand coal-fields, on the west side of the South Island. The coal obtained from the Brunner mine and despatched from the former port is of high quality. As a steam-coal it is said to be 20 per cent. better than the best New South Wales coal.

The tables on pp. 823–5 show that New Zealand's exports are essentially from her agriculture—wool and mutton from her sheep; butter and cheese from her cattle. Three-quarters of the exports go to the mother country and half the imports come therefrom, and since 1903 there has been a preferential tariff in favour of the United Kingdom.

TOWNS OF NEW ZEALAND, 1935

Auckland . . .	223,000	Christchurch . .	132,000
Wellington . . .	148,000	Dunedin . . .	89,000

THE PACIFIC ISLANDS OUTSIDE OF AUSTRALIA

NEW GUINEA, which is about the same size as New South Wales, is the largest island in the world, with the exception of Australia. Its western half, as far as the meridian of 141° E., has long been claimed by the Dutch. In May 1885 the southern portion of the eastern half, together with the Louisiade Archipelago, was declared under British, the northern under German, influence. In September 1888 the section under British influence was formally declared a British Crown Colony, but it was handed over to the Commonwealth of Australia in 1901 and is now officially known as Papua. The German section, now known officially as New Guinea, has been assigned to Australia by a mandate of the League of Nations issued in December 1920.

The surface of the island is in many parts mountainous. The whole of the narrow south-eastern extremity (which lies almost entirely within the British protectorate) is traversed by chains of mountains, known as the Owen Stanley Range, with peaks upwards of 13,000 feet high. Lying within the monsoon area, the whole island receives copious rains during about half the year, and, like other tropical countries with an abundant rainfall, New Guinea is covered with dense forests, which are one of the chief causes why the interior of the island remained so long unexplored. Two great navigable rivers served as highways into the interior. One of these is the Fly, which forms a great delta on the western side of the Gulf of Papua in British territory. The other is the Sepik (called by the Germans the Kaiserin Augusta), which enters the sea near the middle of the north-eastern coast-line. Neither of these rivers, however, served as the means of gaining much knowledge of the land beyond its banks; the exploration for minerals, often with the help of the aeroplane, has been necessary for that.

Like other uncivilised natives of tropical countries, the inhabitants of New Guinea are very indolent. The food-plants which they grow are mainly such as require but little cultivation—bananas, yams, sugar-cane, coconuts, and taro; but in addition to these tobacco is also grown, and is indeed so highly prized that it is the chief article of barter with the natives. The trade is very trifling; the chief exports are copra, gold, rubber, trepang, and pearl-shell. Supplies of the two latter are becoming exhausted. The difficulty of

obtaining labourers will probably prove a great obstacle in the way of creating export products of a more lucrative kind, such as are produced in Ceylon and Jamaica. Alluvial gold-fields are worked by Europeans, chiefly in the Louisiade Archipelago, and there are prospects of petroleum. In Papua the great bulk of the land is held to belong to the natives and private purchases from them are forbidden. The government is the sole legal purchaser, and grants leasehold tenures to planters. There are about 60,000 acres of plantations, mainly coconuts, leased to Europeans.

Mission stations have existed for many years at different points of the coast now under the protection of Great Britain, and in the schools belonging to the stations many native children are educated. many of the teachers being natives of other islands of the Pacific. The seat of administration of Papua is at Port Moresby, which lies to the east of the Gulf of Papua, and has regular steam communication with several ports in Queensland. It lies behind a long barrier reef which skirts the whole of this part of the New Guinea coast, access to it being obtained by one of the numerous deep channels by which this reef, like the Great Barrier Reef of the neighbouring coast of Australia, is crossed.

MELANESIA. This name, meaning 'islands of the blacks,' is applied to several groups of small islands to the east and south-east of New Guinea, inhabited by Papuans.

The islands of New Britain, New Ireland, the Admiralty group, and others to the north of the eastern end of New Guinea, once known as the Bismarck Archipelago, belonged before the War to Germany, to which also belonged a portion of the Solomon Islands. The remainder of the Solomon Islands are British; the New Hebrides are administered jointly by France and Britain, whilst New Caledonia, one of the chief sources of nickel, along with the adjacent group of the Loyalty Islands to the east, belong to the French. New Caledonia is skirted all round by a long line of coral reefs, which stretch for a considerable distance to the north-west, enclosing a number of small islands. Numea or Noumea, in the south-west of the island, is a port of call for the vessels of the French line of steamers which visit the ports of Australia. The former German islands of the Solomon group passed by mandate to Australia with German New Guinea, but the others remain a British protectorate. In the New Hebrides neither of the ruling powers has the right to form settlements on the islands.

POLYNESIA. This name is applied to all the small islands of the Pacific Ocean, with the exception of those already mentioned. They are almost all situated within the tropics, and the chief food of the people, in addition to those already mentioned as cultivated in New Guinea, is the bread-fruit. Of most of them the chief commercial product is copra. A few of them have a very high value on account of their phosphatic guanos, none more so than the small

islands of Nauru and Ocean just south of the equator to the west of the Gilbert Group, both now British. Nauru, formerly German, was assigned to the British Empire by mandate, and it was agreed in 1919 by Great Britain, Australia, and New Zealand, that Australia should appoint the first administrator for a term of five years, thereafter the administrator being appointed as the three governments should decide. The people belong to a physically fine tall race with a clear brown skin and smooth hair, the race which includes the Maori and is now classed by ethnologists as a member of the great Caucasic stock. Christianity has been introduced with considerable success on many of the islands.

The **Fiji Islands** are a group composed mainly of volcanic islands situated to the north of New Zealand, and mostly lying between the parallels of 16° and 19° S. Their total area is rather larger than that of Wales, and Viti Levu, the largest of the islands, embraces more than half the land-surface belonging to the group. The islands were ceded in 1874 by their native king to Britain, and now form a British Crown Colony. Even before that time people of European origin had established plantations of tropical crops on several of the islands, and since that date the products of such plantations (chiefly coconuts and sugar, but also bananas, rice, pineapple, and cotton) have increased very greatly, and a large trade has thus grown up. The output of settlers, both Polynesian and Indian, is also large. The chief towns of the group are seaports with fine harbours protected by coral reefs. The capital is Suva, in the south-east of Viti Levu. The next in importance is Levuka, the former capital, on a small island to the east of Viti Levu. The small island of Rotuma, to the north of the Fiji group, is also British and is annexed to the colony of Fiji.[1]

The **Tonga** or Friendly and **Samoan** or Navigator Islands lie to the east of the Fiji group, and still further east are the **Cook** or Hervey Islands, the **Society** and **Low** Islands. In 1888 the British flag was hoisted on the Hervey group, the principal of which is Rarotonga, and the whole group is now incorporated in the Dominion of New Zealand. To the north of this group in about 9° S. lies Penrhyn Island, now also British, and still further north (between 0° and 5° N. and east of 160° W.) lie two other small islands now British, Fanning Island and Christmas Island. All three yield pearl-shell and copra, and are of importance as lying on the route of the telegraph cable to New Zealand and Australia. In 1899 the Samoan Islands were divided between the German Empire and the United States, the German Empire receiving the islands of Savaii and Upolu, the

[1] The total population of the group in 1891 was 124,000 (Europeans, 2,036; Fijians, about 111,000; Indians, 7,500; Polynesians, 2,300); in 1901, 118,000 (Europeans, 2,447); in 1911, 140,000 (Europeans, 3,707); in 1934, 197,449 (Europeans, 4,763; Fijians, 98,479; Indians, 83,289; half-castes, 3,717; Chinese, 1,486).

latter containing the port of Apia, long the centre of German trade with the Pacific Islands, the chief product of which for European markets is copra. The United States obtained Tutuila, with the fine natural harbour of Pago-pago (pronounced Pango-pango). The former German portion of the group has been placed under the administration of New Zealand. At the same time the right of the British to the Tonga Islands was recognised. The Society Islands, of which the most important is the charming volcanic island of Tahiti, are under French protection, and so also are the Low Islands and the Marquesas group, to the north of the latter.

Between the equator and 15° N. are the **Pelew, Caroline,** and **Marshall** Islands, in that order from west to east, and, north of the Carolines, the **Marianne** or Ladrone Islands. All these, with the exception of the island of **Guam,** the largest of the Ladrones, formerly belonged to the Germans, and have, with the same exception, been assigned by mandate to the Japanese. Guam was ceded by Spain to the United States, and has been made a naval station. The Gilbert Islands to the south of the Marshall group and the Ellice Islands further to the south form, since 1892, a British protectorate, of which the seat of administration is in Ocean Island.

The **Hawaiian Islands** (formerly known in Britain as the Sandwich Islands) are an important group of volcanic islands nearer the coast of North America, between 19° N. and the Tropic of Cancer, belonging since 1898 to the United States, in which since 1900 it holds the position of a territory, thus sharing its customs tariff. In area they are about equal to the Fiji Islands, which they resemble in the nature of their products. The chief island is Hawaii, on which the extinct volcano of Mauna Kea rises to the height of nearly 14,000 feet. Even before the group was annexed to the United States, sugar, molasses, and rice were admitted from the Hawaiian Islands into that country duty-free. Wheat, flour, and pork are the principal articles which the islands take in return. Under the treaty, concluded in 1876, providing for the duty-free imports just mentioned there was a rapid increase in the import of raw sugar from this group into the United States, and sugar is still the leading export of Hawaii. The plantations all belong to people of European stock, but the labourers are immigrants. The cultivation of pineapples has long been a leading industry and the output approaches that of sugar in value. The natives are an apparently joyous race, but now only constitute 6 per cent. of the total population of 385,000 (1935). Part-Hawaiians form another 9 per cent., Japanese nearly 40 per cent., Chinese, Portuguese, and Filipinos are also numerous. The capital, Honolulu, on the island of Oahu, is an important port of call, being visited annually by over 1,200 vessels (10,000,000 tons), and the Hawaiian Islands have achieved world-wide fame in recent years as holiday and tourist resorts.

APPENDIX

SHIPPING TABLES

I. TONNAGE OF MERCHANT NAVIES IN MILLIONS[1]

—	1850.	1860.	1870.	1880	1890.	1900.	1910.
United Kingdom	3·57	4·66	5·69	6·57	7·98	9·30	11·56
United States[2]	1·59	2·55	1·52	1·35	0·95	0·83	0·79
German Empire[3]	—	—	0·98	1·18	1·43	1·94	2·90
Norway[4]	0·30	0·56	1·02	1·52	1·71	1·51	1·53
Japan[5]	—	—	—	—	—	0·86	1·65

II. AGGREGATE GROSS TONNAGE[6] OF VESSELS ABOVE 100 TONS BURDEN BELONGING TO ALL COUNTRIES WITH A TOTAL OF MORE THAN 200,000 TONS

Countries.	1914.		1921.		1925.		1935.	
	Million Tons.	Percentage of Total.	Million Tons.	Percentage of Total.	Million Tons.	Percentage of Total.	Million Tons.	Percentage of Total.
British: United Kingdom	18·88	44·4	19·29	35·6	19·11	31·1	17·40	27·8
British: British Dominions	1·40	3·3	1·95	3·6	2·51	4·1	2·58	3·9
British: British total	20·28	47·7	21·24	39·2	21·62	35·2	19·98	30·8
United States	1·84	4·3	12·31	22·9	13·60	22·1	12·75	19·1
France	1·92	4·5	3·05	6·5	3·50	5·7	3·03	4·7
Japan	1·64	3·9	3·00	5·5	3·84	6·3	4·09	6·3
Italy	1·43	3·4	2·38	4·4	2·83	4·6	2·88	4·4
Norway	1·92	4·5	2·29	4·2	2·51	4·1	3·97	6·1
Holland	1·47	3·4	2·21	4·1	2·56	4·2	2·56	4·0
Spain	0·88	2·1	1·09	2·0	1·24	2·0	1·18	1·8
Sweden	0·99	2·3	1·04	1·9	1·25	2·0	1·55	2·4
Denmark	0·77	1·8	0·87	1·6	1·01	1·7	1·10	1·7
Germany	5·10	12·0	0·65	1·2	2·95	4·8	3·70	5·7
Greece	0·82	1·9	0·58	1·1	0·76	1·2	1·71	2·6
U.S.S.R.	—	—	—	—	—	—	1·11	1·7
Other Countries	—	—	—	—	—	—	5·26	8·1
Foreign Countries, total	22·23	52·3	32·98	60·8	39·78	64·8	44·91	69·2
Total	42·51	100·0	54·22	100·0	61·40	100·0	64·89	100·0

[1] The figures down to 1910 are taken from a British Blue-Book (Cd. 7033] of 1913, where they are given as extracted from 'Lloyds' Register,' and probably, therefore, give the sum of the net tonnage of sailing-vessels and the gross tonnage of steamers, usually exclusive of vessels under 100 tons.

[2] Vessels registered for oversea trade.

[3] Vessels of 17½ tons and upwards.

[4] Vessels of 4 tons and upwards.

[5] Vessels of foreign type, but including sailing-vessels of half Japanese, half foreign type; in all cases gross tons.

[6] Not comparable therefore with the figures in Table I, which reckons, except for Japan, only the net tonnage of sailing-vessels.

TABLE SHOWING THE AVERAGE PRODUCTION OF GOLD AN SILVER IN FIVE-YEAR PERIODS, 1871–75 TO 1886–90, AND TH YEARLY PRODUCTION FROM 1890

Years.	Thousand Ozs.		Years.	Thousand Ozs.	
	Gold, Fine.	Silver.		Gold, Fine.	Silver.
1871–75	4,987	61,493	1912	22,945	224,300
1876–80	5,340	70,599	1913	22,381	223,900
1881–85	4,940	85,569	1914	21,846	168,400
1886–90	5,461	108,912	1915	22,888	184,200
1891	6,320	137,171	1916	21,970	168,800
1892	7,094	153,152	1917	20,289	174,200
1893	7,619	165,473	1918	18,436	197,400
1894	8,764	164,610	1919	17,665	174,500
1895	9,615	167,801	1920	16,418	175,400
1896	9,784	157,061	1921	15,538	171,300
1897	11,420	160,421	1922	15,067	213,500
1898	13,878	169,055	1923	17,398	242,500
1899	14,838	168,337	1924	18,678	248,000
1900	12,315	173,591	1925	19,026	245,214
1901	12,626	173,011	1926	19,349	253,795
1902	14,355	162,763	1927	19,431	253,981
1903	15,853	167,689	1928	19,756	257,925
1904	16,804	164,195	1929	19,497	261,715
1905	18,396	172,318	1930	20,160	248,100
1906	19,471	165,054	1931	22,330	198,800
1907	19,956	184,194	1932	24,150	168,700
1908	21,378	203,186	1933	25,338	169,200
1909	22,248	212,100	1934	27,620	190,900
1910	21,972	221,700	1935	30,500	215,900
1911	22,222	226,200	1936	35,000	—

PRINCIPAL UNITS OF THE METRIC SYSTEM WITH THEIR ENGLISH EQUIVALENTS

(According to a statement made to the French Académie des Sciences on February 4, 1889, the metric system of weights and measures was obligatory in 1887 in countries with an aggregate population of 302½ millions, and was optional in other countries, among which is the United Kingdom, with an aggregate population of 97 millions. It was at the same date admitted in principle or applied in part in countries with an aggregate population of 395 millions. In all, a population of 795 millions recognised the system in some way. See 'Board of Trade Journal,' No. 32, p. 303.)

1 metre	= 39·37 inches = 3·28 feet.
(1 kilometre	= 0·6214 mile.)
1 are	= 1076·4 square feet = 0·0247 acre.
(1 hectare	= 100 ares, therefore = 2·47 acres.)
(1 sq. kilometre	= 100 hectares = 0·386 sq. mile. Population per sq. kilometre × 2·59 = population per sq. mile.)
1 stere (or cubic metre)	= 61,028 cubic inches = 35·317 cubic feet.
1 gramme	= 0·035 oz. = 0·0022 lb. avoir.
(1 hectogramme	= 3·5274 oz.)
1 kilogramme	= 2·205 lbs.
1 metric quintal	= 100 kilos = 220·5 lbs.
(1 metric ton	= 1000 kilos = 2204·6 lbs. = 0·984 English ton.)
1 litre	= 1·76 pint.
(1 hectolitre	= 22·0097 gallons, or 2·7512 bushels. Hectolitres per hectare × 1·113 = bushels per acre. Kilos per hectare ÷ 69 = bushels of wheat per acre at about 62 lbs. to the bushel.)

AREA AND POPULATION OF THE PRINCIPAL COUNTRIES OF THE WORLD

Explanations

I. Area in thousands of square miles, in italics for pre-war states.
II. Population in millions in the year stated.
III. Density of population = number of inhabitants per square mile.
IV. Year of latest census.
V. Population in millions at latest census.

B. = British. M. = Mandate.

Countries and Islands.	I. Area.	Year.	II. Population.	III. Density.	IV. Year.	V. Population.
Afghanistan	245 (?)	—	12·0 (?)	—	—	—
Alaska	591	1920	0·05	0·09	1930	0·06
Albania	17	—	0·8	48·0	1930	1·0
Arabia	1,000 (?)	—	10·0 (?)	—	—	—
Algeria	222	1921	5·8	26·1	1931	6·6
Angola	485	1914	2·1	4·4	1931	2·6
Argentina	1,080	1924	9·5	6·8	1935	12·2
Australian Commonwealth (B.)	2,975	1921	5·4	1·8	1931	6·6
Austria	32	1923	6·5	202·0	1934	6·8
Austria-Hungary	*242*	*1910*	*49·5*	*204·0*	—	—
Barbados (B.)	0·17	1921	0·16	942·0	1931	0·18
Basutoland (B.)	11·7	1921	0·5	42·6	1931	0·5
Bechuanaland (B.)	275	1921	0·15	0·6	1931	0·15
Belgium	11·8	1920	7·5	635·0	1930	8·1
Bolivia	514	1924	3·0	5·8	1932	3·1
Brazil	3,285	1920	30·6	9·3	1933	43·3
British Guiana	89	1921	0·3	3·4	1931	0·3
„ Honduras	8·6	1921	0·05	5·2	1931	0·05
„ N. Borneo	31	1921	0·26	8·3	1931	0·3
Bulgaria	39·8	1920	4·9	123·0	1926	5·5
Canada, Dominion of (B.)	3,730	1921	8·8	2·4	1931	10·4
Ceylon (B.)	25·3	1921	4·5	178·0	1931	5·3
Chile	290	1920	3·8	12·9	1930	4·3
Chinese Republic	4,279	1911	318·7(?)	74·0 (?)	1932	474·8
Colombia	441	1918	5·9	13·3	1928	7·9
Congo, Belgian	909·7	1923	8·5	9·3	1933	9·4
Costa Rica	23	1923	0·5	21·6	1927	0·47
Cuba	44	1923	3·1	72	1933	4·0
Cyprus (B.)	3·6	1921	0·3	86	1931	0·35
Czechoslovakia	54	1921	13·6	251	1930	14·7

Countries and Islands.	I. Area.	Year.	II. Population.	III. Density.	IV. Year.	V. Population.
Denmark	16·6	1921	3·3	136	1930	3·6
Dominican Republic	19·3	1921	0·9	46	1932	1·2
Dutch East Indies	734	1920	49·4	67	1930	60·7
Ecuador	220 (?)	1923	2·0(?)	—	1932	2·6
Egypt (total)	383	1917	12·8	33	1927	14·2
Egypt (excl. desert)	12	1917		1,061		
Estonia	17	1922	1·1	65	1933	1·1
Fiji Islands	7·1	1921	0·16	22	1931	0·19
Finland	133	1922	3·4	26	1930	3·7
Formosa (Taiwan)	13·9	1920	3·7	262	1930	4·6
France	213	1921	39·2	184	1931	41·8
French Equat. Africa	982	1921	2·8	3	1931	3·2
French Indo-China	274	1922	20·0	73	1931	21·4
Germany	182	1919	59·9	328	1933	65·9
Gold Coast (B.)	80	1921	2·1	26	1931	3·2
Greece	49	1920	5·5	113	1928	6·2
Guatemala	42	1920	2·0	47	1932	2·2
Haiti	10·2	1924	2·0	199	1930	2·6
Hawaii (U.S.)	6·5	1920	0·3	39	1930	0·37
Honduras	44	1923	0·8	15	1930	0·85
Hungary	35·9	1920	8·0	222	1930	8·9
Iceland	39·7	1920	0·09	2·4	1930	0·11
India, incl. Burma (B.)[1]	1,805	1921	319	177	1931	352·8
Italy	120	1921	38·8	329	1931	41·2
Irish Free State	26·6	1926	2·97	112	—	—
Jamaica (B.)	4·4	1921	0·86	194	1931	1·1
Japan proper	149	1920	60·0	376	1930	64·5
„ (Empire)	261	1920	77·0	295		90·4
Java and Madura	51	1920	35·0	689	1930	41·7
Kenya (B.)	212	1921	2·4	11	1931	3·1
Korea (Chosen)	85	1920	17·3	204	1930	21·1
Latvia	25	1920	1·5	60	1930	1·9
Liberia	40	—	1·0(?)	—	—	1·0(?)
Lithuania	—	—	—	—	1933	2·4
Madagascar	225	1921	3·4	15	1931	3·7
Malay States, Federated (B.)	27·5	1921	1·3	48	1931	1·6
Malta (B.)	0·2	1921	0·2	1,842	1931	0·25
Mauritius (B.)	0·7	1921	0·4	535	1931	0·4
Mesopotamia (Iraq)	143	1920	2·8	20	—	—
Mexico	767	1921	14·2	19	1930	16·6
Morocco	231	1921	—	25	1931	4·5
Mozambique	428	1923	—	0·6	1930	4·0
Netherlands	12·6	1923	7·2	573	1930	7·9
New Caledonia	7·6	1921	0·05	7	1931	0·06
Newfoundland (B.) (excl. Labrador)	42	1923	0·25	6	1931	0·28
New Zealand (B.)	105	1921	1·2	11·6	1931	1·54
Nicaragua	52	1920	0·64	12	1930	0·75
Nigeria (B.)	336	1921	18·5	55	1931	19·9

[1] Burma, separated 1937, area 233·5; pop. 14·7 millions (1931).

Countries and Islands.	I. Area.	Year.	II. Population.	III. Density.	IV. Year.	V. Populat
Norway . .	125	1920	2·6	21	1930	2·
Nyasaland (B.) .	37·9	1921	1·2	31	1931	1·
Palestine (B.M.) .	9·0	1921	0·76	83	1931	1·0
Panama . .	32	1920	0·4	14	1930	0·4
Papua (B.) . .	91	1921	0·28	3	1931	0·2
Paraguay . .	62(?)	1917	1·0(?)	—	1932	0·9
Persia . . .	628	1920	9·0(?)	15	—	10·0(
Peru . . .	532	1921	5·5(?)	10	1927	6·1
Philippine Islands .	115	1918	10·3	90	1931	12·4
Poland . . .	149	1921	27	182	1931	31·9
Puerto Rico . .	3·4	1920	1·3	378	1930	1·54
Portugal . .	35·5	1920	6·0	170	1930	6·8
Rhodesia, Northern (B.) . . .	291	1921	0·9	5·4	1931	1·4
Rhodesia, Southern (B.) . . .	149	1921	0·8	3·2	1931	1·1
Roumania . .	122	1919	17·4	142	1930	18·0
Russia (U.S.S.R.) .	7,041	1923	132·0	19	1932	163·2
Salvador . .	13	1923	1·5	116	1930	1·5
Sarawak,Borneo and Brunei (B.) .	77	1921	1·0	13	1931	0·9
Siam . . .	200	1920	9·2	46	1929	11·5
Sierra Leone (B.) .	31	1921	1·5	49	1931	1·2
Spain . . .	195	1923	21·8	112	1930	23·6
Straits Settlements (B.) . . .	1·6	1921	0·9	553	1931	1·04
Sudan, Anglo-Egyptian (B.) .	1,014	1921	5·9	5·8	1931	5·6
Sweden . .	173	1923	6·0	35	1932	6·2
Switzerland . .	16·0	1920	3·9	243	1930	4·1
South Africa, Union of(excluding S.W. Africa) (B.) .	472	1921	6·9	13	1931	8·4
South West Africa (B.M.) . .	332	1921	0·23	0·7	1931	0·27
Syria . . .	60	1920	3·0(?)	50	1929	2·8
Tanganyika Territory (B.M.) .	365	1921	4·1	11	1931	5·1
Tunis . . .	48	1921	2·1	43	1931	2·4
Turkey . . .	495	1924	13·4(?)	—	1927	13·6
Uganda (B.) . .	110	1921	3·1	28	1931	3·6
United States (excl. Alaska and other outlying areas) .	2,974	1920	105·7	35·5	1930	122·8
Uruguay . .	72	1922	1·6	22	1932	1·9
Venezuela . .	394	1920	2·4	6	1926	3·0
Yugoslavia . .	96	1920	12·0	125	1931	13·9
Zanzibar (B.). .	1	1921	0·2	195	1931	0·24

LIST OF ALTERNATIVE GEOGRAPHICAL NAMES

N.B.—An important work in the standardising of geographical names is now being carried out by the Permanent Committee on Geographical Names of the Royal Geographical Society. Reference should be made to the various lists of names already published.

Most of the pronunciations given in the following list are merely tentative. Only people who have long resided in foreign lands and have the requisite knowledge and ear can render place-names into phonetic English. The author of this work will esteem it a great favour if such people will assist him by sending corrections, and will gladly acknowledge such.

No attempt has been made to secure completeness, but most well-known names which have undergone change have found a place in the list.

The system used in the pronunciation column is for the most part the 'R.G.S. II. System,' as given on pp. 39–43 of the *Journal R.G.S.*, vol. lvii. (January 1921).

In this system the vowels have their continental sounds :—a as in *lava* ; e as in *eh ?* or as in *bet* ; *e* as in *often* ; i as in *marine* or as in *piano* ; o as in *both* or *rotund* ; ö like the French *eu* in *peu* ; u as in *rude* or as in *pull* ; ü like the French *u* in *tu*. The following diphthongal signs are also used, *ai* as in *aisle*, au like *ou* in *out*, *ei* to represent the two sounds slurred into one syllable as in *Beirut*, *oi* as in *oil*, *ow* to replace *au* in the spelling of Chinese names. The digraph *aw* is used for the simple sound heard in *awl*.

The consonants made use of have the same sounds as in English, but *c* is not used at all. The letter q is used in the R.G.S. system to represent an Arabic sound very difficult to reproduce, but in the list below a *k* is substituted. The letter *s* has only one sound, that heard in *boss* ; *y* is always a consonant, as in *yard*. Where this sound is terminal and belongs to the same syllable as the preceding letter, it is represented by '. The Hungarian Nagy, for example, respelt *nod'*, has a sound closely resembling *noj*.

The following consonantal digraphs are used :—*dh* for the sound of *th* in *this* ; *gh*, the 'soft guttural' heard in *Baghdad*, as pronounced by an Arab (somewhat like the Northumbrian burr) ; *kh* like *ch* in *loch* as pronounced in Scotland ; *ng* as in *sing* ; *sh* as in *shine* ; *th* as in *thick* ; *zh* like *z* in *azure*. The combination *ch* is used as in English for the double sound heard in *church*. No provision is made for the semi-nasal heard in the French *on* and other words.

Where the original spelling is in accordance with this scheme, there is no respelling in the list below, and where the letter *c* occurs it will be understood that, unless the word is respelt, it has the sound of *s* before *e* and *i*, in other situations that of *k*.

To attempt to give all the variations in spelling even of the more familia Chinese names would extend this list unduly, but it may be of use to mention that very frequently the combination *sz* for the sound of *s* is used in the spelling of some Chinese names, that the initial syllable *Si* often has an *h* prefixed, that *ng*, sounded like *ng* in *Sing*, not *ng* in *finger*, if sounded at all, is sometimes given and sometimes omitted at the beginning of syllables (hence such variations as Sian-fu, Singan-fu, Hsian-fu, Hsingan-fu), and that *ao*, *au*, *ou*, and *ow* are all in common use for the same sound.

conv. = conventional.

NAME	PRONUNCIATION	LANGUAGE	EQUIVALENT
Aachen	akh'en	German	Aix-la-Chapelle
Aalst	alst	Flemish	Alost
Abadan'	—	Persian	Jeziret el Khidhr
Abba'zia	abba'tsia	Italian	Opatija
Åbo	o'bo	Swedish	Turku
Adige	a'dije	Italian	Etsch
Adramyttion	adhrami'ti(on)	Greek	Edremid
Adrianople	—	English (conv.)	Edirne
Agh'ri Dagh	—	Turkish	Ararat, Masis, Kuh-i-Nuh
A'gram	—	German	Zagreb, Zagrab
Aia	a'ya	Italian	The Hague
Aix-la-Chapelle	eks la shapel'	French	Aachen
Al'ba Iulia	yu'lia	Italian	Karlsburg, Gyulafehérvár
Alep'po	—	Italian (conv.)	Haleb
Ales'sio	—	Italian	Lješ
Alexandret'ta	—	English and French (conv.)	Iskenderūn
Alma Dagh	—	Turkish	Amanus, Gavur Dagh
Alost'	—	French	Aalst
Amanus	—	Latin (conv.)	Alma Dagh, Gavur Dagh
Amnokhos'tos	—	Greek	Famagusta
Amoy	a-moi'	Chinese (conv.)	Hsiamen
Amu Darya	a'mudar'i-a	Russian	Oxus, Jaihūn
Ancira	anchi'ra	Italian	Angora (Ankara)
Andrinople	—	French	Adrianople
Ankara	an'ka-ra	Turkish	Angora
Ankyra	ang'kira	Greek	Angora
Anti'vari	—	Italian	Tivar, Bar
Antuer'pia	—	Spanish	Antwerp
Antwerpen	antver'pen	Flemish	Antwerp
Anvers	anvers'	French	Antwerp
Anver'sa	—	Italian	Antwerp
Aquisgran	akisgran'	Spanish	Aachen
Aquisgra'na	akwisgra'na	Italian	Aachen
Araks	—	Russian	Araxes, Aras, Yeraskh
Ar'arat	—	Russian (conv.)	Masis, Aghri Dagh, Kuk-i-Nuh
Aras	—	Persian	Araxes, Araks, Yeraskh
Arax'es	—	Latin (conv.)	Araks, Aras, Yeraskh
Argyrokastron	—	Greek	Gjinokastre, Ergeri
Ash'kabad	—	Persian	Askhabad
As'khabad	—	Russian	Ashkabad
Augustówo	augusto'vo	Polish	Avgustovo
Aussig	aus'sikh	German	Usti

Name	Pronunciation	Language	Equivalent
Avgustovo	—	Russian	Augustowo
Avlon	—	Greek	Valona, Vlore, Avloniya
Avloni'ya	—	Turkish	Valona, Vlore, Avlon
Bal'aton	—	Magyar	Platten See
Bâle	—	French	Basel
Bangkok'	—	conv.	Krung Dhebh
Banjoewangi	banyuwang'i	Dutch	Banyuwangi
Banyuwangi	—	Malay	Banjoewangi
Bar	—	Slovenian	Antivari
Basel	ba'zel	German	Bâle
Basile'a	—	Italian, Spanish	Basel
Beirut'	—	Arabic ?	Beyrout or Beyrouth
Bela Crkva	be'la krek'va	Slovenian	Weisskirchen, Fehértemplom
Belgrad	—	conv.	Beograd
Beljak	belyak'	Slovenian	Villach
Beograd	—	Serbian	Belgrade
Bergen	—	Flemish	Mons
Bestereze	bester'che	Slavonic	Bistritz
Beuthen	boi'ten	German	Bytom
Beyrout, Beyrouth	beirut'	French	Beirut
Bistrica	bistri'tsa	Slovenian	Feistritz
Bistritz	bistrits'	German	Bestereze
Bitolj	bitol''	Serbian	Monastir
Björ'neborg	—	Swedish ?	Pori
Bocche di Cat'taro	bōk'ke	Italian	Boka Kotorska
Boden See	bo'den-ze	German	Constance, Lake of
Boghaz Ichi	—	Turkish	Bosporus, Bosfor, Vosporos
Boghazlar'	—	Turkish	Dardanelles, Ellēspontos
Boka Kotor'ska	—	Slovenian	Bocche di Cattaro
Bon'dos	—	Armenian	Trebizond
Bos'for	—	Russian	Bosporus, Vosporus
		Bulgarian	Boghaz Ichi
Bosna Serai'	—	Turkish	Sarajevo
Bos'porus	—	Latin (conv.)	Boghaz Ichi, Vosporos, Bosfor
Brassó	brosh'sho	Magyar	Kronstadt
Bratisla'va	—	Czech	Pressburg, Pozsony
Brno	berno	Czech	Brünn
Brüg'ge	—	Flemish	Bruges
Brünn	—	German	Brno
Brüssel	—	Flemish	Brussels
Brüx	—	German	Most
Bruxelles	brüsel'e	French	Brussels
Budějovice	budyeyovi'tse	Czech	Budweis
Budweis	bud'vais	German	Budějovice
Bursa	—	Turkish	Prousa (Brusa)
Bytom	bütom	Polish	Beuthen
Canton	—	Chinese (conv.)	Kwangchowfu
Capodis'tria	—	Italian	Koper
Caporet'to	—	Italian	Kobarid
Carlsbad	—	German	Karlovy Vary, Karlsbad
Cat'taro	—	Italian	Kotor

NAME	PRONUNCIATION	LANGUAGE	EQUIVALENT
Caucasus	—	Latin (conv.)	Kavkas, Kavkasioni
Celj	tsel'	Slovenian	Cilli
Celovec	tselovets	Slovenian	Klagenfurt
Ceram	se-ram'	Dutch	Serang
Cernaut	chernauts	Roumanian	Czernowitz
Československa (Republika)	ches'ko-slovens'ka	Czech	Czechoslovakia
Cheb	khep	Czech	Eger
Chefoo	chifu'	Chinese (conv.)	Chihfu, Yentai
Chemulp'ho	—	Korean	Jinsen
Cherso	ker'so	Italian	Cres
Chihfu	chifu'	Chinese	Chefoo, Yentai
Chilinfu	—	Chinese	Kirin
Chilung	—	Chinese	Kelung, Kiryu
Chingta'o	—	Tsingtao	Tsingtau, Seito
Chisinau	—	Roumanian	Kishinef
Chosen	chozen'	Japanese	Korea
Chyöijyudo	—	Korean	Quelpart, Saishuto
Cilli	tsil'li	German	Celj
Cluj	kluzh	Roumanian	Kolozsvár, Klausenburg
Cöln	—	German	Cologne
Cologne	koloin'' or kolon''	French and English	Cöln
Con'stance (Lake)	—	conv.	Boden See
Constant'sa	—	Roumanian	Kyustendja
Constantinople	—	conv.	Istanbul, Stambul
Courtrai	kurtre'	French	Kortrijk
Craco'via	—	Italian, Spanish	Cracow
Cracow	krakau	conv.	Kraków
Cres	—	Slav	Cherso
Ćusten'dil	tyusten'dil	Serbian	Kustendil
Czechoslova'kia	chekhoslova'kia	conv.	Československá(Republika)
Czernowitz	chernovits'	German	Cernaut
Dairen'	—		Tairen, Ta-lien, Dal'ni
Dal'ni	—	Russian	Dairen, Ta-lien
Danzig	dan'tsikh	German	Gdańsk
Dardanelles	dar-danelz'	conv. & French	Boghazlar, Ellēspontos
Debar'	—	Serbian	Dibra
Děčin	dyechin	Czech	Tetschen
Delfina'to	—	Italian	Dauphiné, Dauphiny
Demir'Kapi'ja	kapi'ya	Slovenian	Demir Kapu
Demir' Kapu'	—	Turkish	Demir Kapija
Dendermon'de	—	Flemish	Termonde
Den Haag	—	Dutch (familiar)	The Hague
Devin'	—	Slav	Duino
Diyarbekir	—	Turkish	Kara Āmid, Dikranakerd, Diarbekr
Dibra'	—	Turkish & Albanian	Debar
Digione	dijo'ne	Italian	Dijon
Dikranakerd	—	Armenian	Diarbekr, Kara Āmid
Djakova	dya-ko-'va	Albanian	Djakovica
Djakovica	dyakovi'tsa	Serbian	Djakova
Dobrodgea	do'broja	Roumanian	Dobruja
Drač	drach	Serbian	Durazzo

Name	Pronunciation	Language	Equivalent
Drau	—	German	Drava, Drave
Dra'va	—	Slovenian	Drau
Drave	drav	conv.	Drau
Drim	—	Serbian	Drin
Drin	—	Turkish	Drim
Dubrov'nik	—	Slovenian	Ragusa
Duino	—	Italian	Devin
Dulcigno	dulchi'nyo	Italian	Ulcinj
Dünaburg	—	German	Dvinsk,Daugavpils (Latv.)
Dünamünde	—	German	Ust Dvinsk
Duraz'zo	—	Italian	Drač
Dvinsk	—	Russian	Dünaburg (German)
Echmiadzin	—	Russian	Ejmiadzin
Edir'ne	—	Turkish	Adrianople
Ed'remid	—	Turkish	Adramyttion
E'ger	—	German	Cheb
Ejmiadzin	—	Armenian	Echmiadzin
Eperjes	eperyesh	Magyar	Presov
Ergeri	—	Turkish	Argyrokastron, Gjinokastre
Erzurum	—	Turkish	Karin, Erzerum
Erzinjan	—	Turkish (conv.)	Yerznka
Escocia	esko'thia	Spanish	Scotland
Eski Zagra	—	Turkish	Stara Zagora
Eszék	es'ek	Magyar	Osijek, Osjek
Esztergom	estergom'	Magyar	Gran
Etsch	ech	German	Adige
Euboea	yubi'a [1]	Latin (conv.)	Negroponte
	([1] pronounced in Greek evvi'a)		
Famagusta	—	Turkish (conv.)	Amnokhostos
Fehértemplom	—	Magyar	Weisskirchen (Roumania)
Feistritz	fais'trits	German	Bistrica
Fengtienfu	—	Chinese	Mukden
Fili'be	—	Turkish	Philippopolis
Fiu'me	—	Italian	Rijeka, Rjeka, St. Veit am Flaume
Florina	—	Greek	Lerin
Flushing	—	English (conv.)	Vlissingen
Formo'sa	—	Portuguese (conv.)	Taiwan
Fred'rikshamn	(ham)	Swedish	Hamina
Friedrichstadt	fri'drikhshtat	German (conv.)	Jaunjelgava
Fünfkirchen	fünfkirkhen	German	Pečuj, Pécs
Furnes	fürn	French	Veurne
Gal'les	—	Italian	Wales
Gând	—	French	Ghent
Gante	—	Spanish	Ghent
Gävle	yef'le	Swedish	formerly Gefle, Gäfle
Gavur Dagh	—	Turkish	Amanus
Gdańsk	gdan'sk	Polish	Danzig
Geertsbergen	—	Flemish	Grammont
Gent	—	Flemish	Ghent
Giaour Dagh	jaur dagh	conv.	Alma Dagh
Giurgevo	jurje'vo	Bulgarian	Giurgiu
Giurgiu	jurju	Roumanian	Giurgevo
Gorica	gori'tsa	Slovenian	Gorizia, Görz

Name	Pronunciation	Language	Equivalent
Gorizia	gori'tsia	Italian	Gorica, Görz
Görz	—	German	Gorica, Gorizia
Gottschee	got'she	German	Kočevje
Grammont	—	French	Geertsbergen
Gran	—	German	Esztergom
Gravosa	—	Italian	Gruž
Grossa	—	Italian	Dugi
Grosswardein	grosvar'dain	German	Nagyvárad, Oradia Mare
Gruž	gruzh	Croatian	Gravosa
Györ	dyör	Magyar	Raab
Gyulafehérvár	dyulafehervar'	Magyar	Alba Iulia, Karlsburg
Hague, The	—	conv. English for Dutch	's Gravenhage, or Den Haag
Haifang	—	Chinese	Haiphong
Haiphong	haifong'	conv. & French	Haifang
Haleb	—	Arabic	Aleppo
Hamina	—	Finnish	Fredrikshamn
Hancheng	—	Chinese	Seoul, Keijo
Hang'ö	—	Swedish	Hanko
Han'ko	—	Finnish	Hangö
Harbin	—	Chinese (conv.)	Kharbin
Haye, La	la he	French	The Hague
Helsingfors	—	Swedish	Helsinki
Helsinki	—	Finnish	Helsingfors
Her'mannstadt	—	German	Sibiu, Nagyszeben
Hranice	hrani-tse	Czech	Weisskirchen (Moravia)
Hsiamen	—	Chinese	Amoy
Hvar	—	Croatian	Lesina
Iasi	yashi	Roumanian	Jassy
Iceland	—	conv. for Icelandic	I'sland
Iglau	—	German	Jihlava
Ikonion	—	Greek	Konia
Inghilterra		Italian	England
Inglaterra	—	Spanish	England
Ipek	—	Turkish	Peć, Pech
Ishtib	—	Turkish	Štip
Iskenderūn	—	Turkish	Alexandretta
Islini'ye	—	Turkish	Sliven, Slivno
Ison'zo	—	Italian	Soča
Istan'bul	—	Turkish	Constantinople
Izmid	—	Turkish	Nikomēdeia
Izmir	—	Turkish	Smyrna
Jáchymov	yakh'i-mof	Czech	Joachimsthal
Jaihun	—	Persian ?	Oxus, Amu Darya
Jakobstad	ya'kob-shtat	German	Pietarsaari
Janina	—	Slovenian	Yannina, Yaniya
Jarosław	yaros'waf	Polish	Yaroslav
Jassy	yashi	conv.	Iasi
Jaunjelga'va	yaunyelga'va	Lettish	Friedrichstadt
Jelgava	yelga'va	Lettish	Mitau
Jerez	khereth'	Spanish	(formerly) Xeres
Jihlava	yihla'va	Czech	Iglau
Jinsen	—	Japanese	Chemulpho
Joachimstal	(y)	German (conv.)	Jáchymov

Name	Pronunciation	Language	Equivalent
Jugoslavija	yugoslavi'ya yugosla'via	Slovenian	Yugoslavia
Kalkande'len	—	Turkish	Tetovo
Kanto'shu	—	Japanese	Kwangtung
Karafu'to	—	Japanese	Sakhalin (S. of 50° N.)
Karin	—	Armenian	Erzerum
Karlócza	karlot'sa	Magyar	Karlowitz, Karlovci
Karlovac	karlo'vats	Slovenian	Karlstadt
Karlovci	karlov'tsi	Croatian	Karlócza, Karlowitz
Kar'lovy Váry	kar'lovi vari	Czech	Karlsbad, Carlsbad
Karlowitz	kar'lovits	German	Karlovci, Karlócza
Karlsbad	karlz'bad	German	Carlsbad, Karlovy Vary
Karlsburg	karlz'burg	German	Alba Iulia, Gyulafehérvár
Karlstadt	karl'shtat	German	Karlovac, Károlyvaros
Károlyváros	ká'rol'va'rosh	Magyar	Karlovac, Karlstadt
Kaschau	kashau	German	Kassa
Kassa	kash'a	Magyar	Kaschau
Kavkasio'ni	—	Georgian	Caucasus, Kavkaz
Kavkaz	kaf'kas	Russian	Caucasus, Kavkasioni
Kazvin	—	Persian (conv.)	Qazvin
Kei'jo	—	Japanese	Seoul, Hancheng
Kelung	—	Chinese (conv.)	Chilung, Kiryu
Khar'bin	—	Russian	Harbin
Khaskö'i	—	Turkish	Khaskovo
Khasko'vo	—	Slav	Khasköi
Kiirun	—	Official Japanese	Kelung
Kirin'	—	Chinese (conv.)	Chilinfu
Kiryu	—	Japanese	Kelung, Chilung
Kishinef	—	Russian	Chisinau
Klagenfurt	—	German	Celovec
Klau'senburg	—	German	Cluj, Kolozsvár
Klis	—	Croatian	Clissa
Ko'barid	—	Slav	Caporetto
Kolozsvár	ko-lozh-var'	Magyar	Cluj, Klausenburg
Komar'no	—	Czech	Komorn
Komárom	—	Magyar	Komorn
Ko'nia	—	Turkish (conv.)	Qoniya, Ikonion
Koper'	—	Slav	Capodistria
Köpri'li	—	Turkish	Veles
Korčula	korchu'la	Croatian	Curzola
Korea	kori'a	Chinese (conv.)	Chosen
Körmöczbanya	körmötsban'ya	Magyar	Kremnitz
Kortrijk	kortraik	Flemish	Courtrai
Korunat'	—	Croatian	Incoronata
Košice	koshi'tse	Czech	Kaschau, Kassa
Kotor'	—	Slovenian	Cattaro
Krain'burg	—	German	Kranj
Kraków	kra'kuf	Polish	Cracow
Kranj	kran'	Slovenian	Krainburg
Krašovo	krasho'vo	Slovenian	Krassova
Krassova	krasho'vo	Magyar	Krašovo
Kremnitz	kremnits	German	Körmöczbánya
Krk	—	Slav	Veglia
Kron'stadt	—	German	Brassó
Krung Dhebh	—	Siamese	Bangkok

Name	Pronunciation	Language	Equivalent
Kuh-i-Nuh	—	Persian	Ararat, Masis, Aghri Dagh
Kul'pa	—	German	Kupa
Ku'pa	—	Slovenian	Kulpa
Kwangchowfu	—	Chinese	Canton
Kwangtung	—	Chinese	Kantoshu
Kyustendil	—	Turkish	Ćustendil
Kyustend'ja	—	Turko-Bulgarian	Constantsa
Laas	las	German	Lož
Lagos'ta	—	Italian	Lastovo
Laibach	lai'bakh	German	Ljubljana, Lyublyana
Laodikeia	laodik'ia	Greek	Latakia
Lataki'a	—	Arabic (conv.)	Laodikeia
Lemberg	—	German (conv.)	Łwów
Lerin	—	Slovenian	Florina
Le'sina	—	Italian	Hvar
Leuven	löven	Flemish	Louvain
Levkas'	lefkas'	Greek	Santa Maura
Liberec	li'berets	Czech	Reichenberg
Liepaja	—	Latvi	Libau (German)
Liége	liezh'	French	Luik, Lige, Lüttich
Lige	lizh	Walloon	Liége, Luik, Lüttich
Liegi	lie'ji	Italian	Liége
Lieja	lie'ha	Spanish	Liége
Lier	—	Flemish	Lierre
Lierre	—	French	Lier
Lika-Korba'va	—	Magyar	Lika-Krbava
Lika-Krba'va	—	Croatian	Lika-Korbava
Lis'sa	—	Italian	Vis
Lješ	lyesh	Slovenian	Alessio
Ljubljana	lyublya'na	Slovenian	Laibach
Lošinj	loshin'	Slav	Lussin
Lova'nia	—	Italian	Louvain
Löwen	löven	German	Louvain
Lubia'na	—	Italian	Ljubljana, Laibach
Luik	loik	Flemish	Liége, Lige, Lüttich
Lushun	—	Chinese	Port Arthur, Ryojun
Lus'sin	—	Italian	Lošinj
Lüttich	lut'ikh	German	Liége, Luik, Lige
Łwów	wuf	Polish	Lemberg
Lyublyana	(see Ljubljana)		
Magon'za	—	Italian	Mainz
Maguncia	magun'thia	Spanish	Mainz
Mainz	maints	German	Mayence
Malines	malin'	French	Mecheln
Mallorca	malyor'ka	Spanish	Majorca
Mar'burg	—	German	Maribor
Marian'ské'Lázné	—	Czech	Marienbad
Maria Theresiopel	mari'a terezio'pel	German	Subotica, Szabadka
Mar'ibor	—	Slovenian	Marburg
Mari'enbad	—	German	Marianské Lázné
Maros	ma'rosh	Magyar	Moriš
Ma'sis	—	Armenian	Ararat, Aghri Dagh, Kuh-i-Nuh
Mayence	—	French	Mainz

Name	Pronunciation	Language	Equivalent
Mecheln	mekh'eln	Flemish	Malines
Mitau'	—	German (conv.)	Jelgava
Mohač	mohach'	Slovenian	Mohacz
Mohacz	mohach'	Magyar	Mohač
Monastir'	—	Turkish, Greek	Bitolj
Mons	mons (semi-nasal)	French	Bergen
Moriš	morish'	Slovenian	Maros
Most	⁄—	Czech	Brüx
Muk'den	—	Russian	Fengtienfu
Mül'hausen	—	German	Mulhouse
Mulhouse	müluz'	French	Mülhausen
Nagyszeben	nod'seben	Magyar	Sibiu, Hermannstadt
Nagyvárad	nod'va'rad	Magyar	Oradia Mare, Grosswardein
Nanching	—	Chinese	Nanking
Nanking'	—	Chinese (conv.)	Nanching
Naren'ta	—	German	Neretva
Negropon'te	—	Italian	Euboea
Neret'va	—	Slovenian	Narenta
Neufahrwasser	noifarvas'-er	German	Nowy port
Neusatz	noi'zats	German	Novi Sad, Ujvidek
Neutra	noitra	German	Nyitra, Nitra
Nikomēdeia	nikomedhi'a	Greek	Izmid
Nitra	—	Czech	Neutra, Nyitra
Nova Za'gora	—	Bulgarian	Yeni Zagra
Novi Sad	—	Slovenian	Neusatz, Ujvidek
Nowy port	novi port	Polish	Neufahrwasser
Nyitra	—	Magyar	Neutra, Nitra
Nystad	ni'stad	Swedish	Uusikaupunki
Odrin'	—	Bulgarian	Adrianople
Oedenburg	ödenburg	German	Sopron
Ofen	—	German	Pest
Oh'rid	—	Slovenian	Okhrida
O'khrida	—	Turkish	Ohrid
Ol'mütz	ol'müts	German	Olomouc
Olomouc	olomo-uts'	Czech	Olmütz
Oltu	olt	Roumanian	Aluta
Opati'ja	(ya)	Slav	Abbazia
Opa'va	—	Czech	Troppau
Oprtalj	oprtal'	Slav	Portole
Ora'dia Mare	—	Roumanian	Grosswardein, Nagyávrad
Oršava	or'shava	Slovenian	Orsova
Orsova	or'shovo	Magyar	Oršava
O'sek	—	Slovenian	Esseg, Osijek, Eszek, Osjek
Osijek	o'siyek	Croatian	Esseg, Essegg, Eszek, Osek
Osjek	os'yek'	Croatian	Esseg, Essegg, Eszek, Osek
O'sor	—	Slav	Ossero
Oulu	o'ulu	Finnish	Uleåborg
Oxus	—	Latin (conv.)	Amu Darya, Jaihun
Palmy'ra	—	Latin (conv.)	Tadmur
Pančevo	pan'chevo	Slovenian	Pancsova
Pancsova	pan'chovo	Magyar	Pančevo
Parainen	—	Swedish	Pargas
Paren'zo	—	Italian	Porec

Name	Pronunciation	Language	Equivalent
Par'gas	—	Finnish	Parainen
Parigi	pari'ji	Italian	Paris
Passar'evitz	(ts)	German	Požarevac
Pazar'	pa-zar	Slovenian	Janica, Jenidje Vardar
Peć	pet'	Slovenian	Ipek
Pech			
Pécs	pech	Slovenian	Fünfkirchen
Pečuj	pech'ui	Slovenian	Fünfkirchen
Peiching'	—	Chinese	Peking
Peking'	—	Chinese (conv.)	Peiching
Pelješac	pél'yeshats	Slovenian	Sabbioncello
Perle'pé	—	Turkish	Prilep, Prilip
Pest	pesht	Magyar	Ofen
Pétervá'rad	—	Magyar	Peterwardein, Petrovaradin
Peterwardein	petervar'dain	German	Petrovaradin, Pétervarad
Petrova'radin	—	Croatian	Pétervárad, Peterwardein
Petrozsény	petrozhen'	Magyar	Pietrosani, Pietroshani
Pet'tau	—	German	Ptuj
Philippo'polis	—	Latin (conv.)	Filibe, Plovdiv
Pietarsaa'ri	—	Finnish	Jakobstad
Pietroşani, Pietrosha'ni	—	Roumanian	Petrozsény
Pil'sen	—	German	Plzen
Platten See	plat'en ze	German	Balaton
Ple'ven	—	Serbian	Plevna
Plev'na	—	Turkish	Pleven
Plovdiv	—	Bulgarian	Philippopolis
Plzen	pelzen	Czech	Pilsen
Po'la	—	German	Pulj
Poreč	porech'	Slovenian	Parenzo
Po'ri	—	Finnish	Björneborg
Port Arthur	—	Russian (conv.)	Lushun, Ryojun
Posen	po'zen	German	Poznań
Požarevac	pozha'revats	Serbian	Passarevitz
Požega	pozhe'ga	Croatian	Pozsega
Poznań	poznan'	Polish	Posen
Pozsega	pozhe'ga	Magyar	Požega
Pozsony	pozhon''	Magyar	Pressburg, Bratislava
Prag	—	German	Prague, Praha
Prague	—	French	Praha, Prag
Pra'ha	—	Czech	Prague, Prag
Presov	—	Czech	Eperjes
Press'burg	—	German	Pozsony, Bratislava
Prilep', Prilip'	—	Slovenian	Perlepe
Priz'ren	—	Slovenian	Prizrend
Priz'rend	—	Turkish	Prizren
Prousa	pru'sa	Greek	Brusa
Ptuj	ptu'i	Slovenian	Pettau
Pulj	pul'	Slovenian	Pola
Quelpart	kwel'part	Dutch (conv.)	Chyöijyudo, Saishuto
Raab	—	German	Györ
Rab	—	Croatian	Arbe
Rad'mansdorf	—	German	Radovljica
Radovljica	radovlyi'tsa	Slovenian	Radmansdorf
Ragu'sa	—	Italian	Dubrovnik

NAME	PRONUNCIATION	LANGUAGE	EQUIVALENT
Rasa	—	Slav	Arsa
Rau'ma	—	Finnish	Raumo
Rau'mo	—	Swedish	Rauma
Reich'enberg	raikh'enberg	German	Liberec, Liberets
Re'no	—	Italian	Rhine
Re'val	—	Russian (conv.)	Tallinn
Rijeka Rjeka	riye'ka rye'ka	Slovenian	Fiume, St. Veit am Flaum
Ro'dano	—	Italian	Rhone
Rodosto	—	Italian (conv.)	Tekir Dagh
Roeselaere	ruzela're	Flemish	Roulers
Roulers	rulers'	French	Roeselaere
Rovigno	rovi'nyo	Italian	Rovinj
Rovinj	rovin''	Slovenian	Rovigno
Ru'miya	—	Turkish	Urmia, Urúmieh (Urūmīyeh)
Ruščuk	rushchuk	Turkish	Ruse
Ru'se	—	Bulgarian	Ruščuk
Ryojun	—	Japanese	Port Arthur, Lushun
Sabbioncello	sabbionchel'lo	Italian	Pelješac
Sagor	za'gor	German	Zagorje
Sai'da	—	Arabic	Sidon
Saishu'to	—	Japanese	Quelpart, Chyöijyudo
Sakha'lin	—	Russian	Karafuto
Salo'na	—	Italian	Solin
Santa Mau'ra	—	Italian	Levkas
Šarajevo	saraye'vo	Serbian	Bosna Serai
Sarplan'ina	shar-	Serbian	Shardagh
Scardo'na	—	Italian	Skradin
Schemnitz	shemnits	German	Selmecz-es-Bélabánya, Silesia
Schlesien	shle'zien	German	Stiavnica
Scozia	sko'tsia	Italian	Scotland
Scu'tari	—	Italian	Skadar, Shkodra
Sebe'nico	—	Italian	Šibenik
Segna	se'nya	Italian	Senj, Zengg
Seito	sai'to	Japanese	Tsingtao, Tsingtau, Chingtao
Selce	sel'tse	Croatian	Szelce
Selmecz-es-Bélabánya	shelmech-esh-belabanya	Magyar	Schemnitz
Semen'dria	—	German	Smederevo
Semlin	zem'lin	German	Zemum, Zimony
Senj	sen'	Slovenian	Zengg, Segna
Seoul	se-ul'	Korean (conv.)	Keijo, Hancheng
Serang'	—	Malay ?	Ceram
's Gravenha'ge	—	Dutch	The Hague
Shantow'	—	Chinese	Swatow
Shko'dra	—	Albanian	Skadar, Scutari
Shumla	—	Turkish	Šumen
Sibenik	shibenik	Slovenian	Sebenico
Sibiu'	—	Roumanian	Hermannstadt, Nagyszeben
Sidon	—	Hebrew (conv.)	Saida
Silesia	saili'zhia	English (conv.)	Schlesien, Szlask

Name	Pronunciation	Language	Equivalent
Si'sak / Si'sek	—	Croatian	Sziszek, Sissek
Sis'sek	—	German	Sisek, Sisak, Sziszek
Şiş'tov	shishtov	Roumanian	Sistova
Sis'tova	—	Bulgarian(conv.)	Şistov
Ska'dar	—	Slovenian	Scutari, Shkodra
Skoplje	skop'lye	Slovenian	Üsküb
Sle'sia	—	Italian, old Polish	Silesia, Szlask
Smedere'vo	—	Slovenian	Semendria
Smyrna	—	Latin (conv.)	Izmir
Soča	soch'a	Slovenian	Isonzo
Soerabaja	surabai'a	Dutch	Surabaya
Solin'	—	Croatian	Salona
Somes,	somesh	Roumanian	Siamos
Sopron	shopron	Magyar	Oedenburg
So'ria	—	Italian	Syria
Spa'lato	—	Italian	Spljet
Spljet	splyet	Slovenian	Spalato
Srem	—	Croatian	Szerém, Syrmien
Srijem	sri'yem	Croatian	Szerém, Syrmien
Srjem	syrem	Croatian	Szerém, Syrmien
Stambul	—	Turkish	Constantinople
Stara Za'gora	—	Bulgarian	Eski Zagra
Steinamanger	shtainamang'er	German	Szombathely
Stiavnica	stiavni'tsa	Czech	Schemnitz
Štip or Shtip	shtip	Slovenian	Ishtib
Ston	—	Croatian	Stagno
Strasbourg	strasbur'	French	Strassburg
Strassburg	stras'burkh	German	Strasbourg
St. Trond	—	French	St. Truijen
St. Truijen	—	Flemish	St. Trond
Stuhlweissenburg	shtulvaisen-burg	German	Szekesfehérvár
St. Veit am Flaum	—	German	Rijeka, Rjeka, Fiume
Suboti'ca / Suboti'tsa	—	Slovenian	Szabadka, Maria Theresiopel
Suecia	sue'thia	Spanish	Sweden
Suiza	sui'tha	Spanish	Switzerland
Sumen	shumen	Bulgarian	Shumla
Suomenlinna	—	Finnish	Sveaborg
Šur	—	Arabic	Tyre, Zor
Suraba'ya	—	Malay ?	Soerabaja
Sve'aborg	—	Swedish	Suomenlinna
Svezia	sve'tsia	Italian	Sweden
Svizzera	svi'tsera	Italian	Switzerland
Swatow	—	Chinese (conv.)	Shantow
Syrmien	sir'mien	German	Srijem, Srjem, Srem, Szerém
Szabadka	sobod'ko	Magyar	Subotica, Maria Theresiopel
Szamos	samosh	Magyar	Somes
Szeged	seged	Magyar	Szegedin
Szegedin	—	German	Szeged

Name	Pronunciation	Language	Equivalent
Szekesfehérvár	sekeshfehervár	Magyar	Stuhlweissenburg
Szelce	sel'tse	Magyar	Selce
Szerém	serem'	Magyar	Syrmien, Srijem, Srjem, Srem
Sziszek	sis'sek	Magyar	Sissek, Sisek, Sisak
Szlask	shlask	Polish	Silesia
Szombathely	sombot-hel''	Magyar	Steinamanger
Tad'mur	tad'mur	Arabic	Palmyra
Tai'ren	—	?	Dairen
Taiwan'	—	Japanese and Chinese	Formosa
Ta-lien'	—	Chinese	Dairen, Dal'ni
Tallinn'	—	Esthonian	Revel
Tamiš	ta'mish	Slovenian	Temes
Tam'merfors	—	Swedish ?	Tampere
Tam'pere	—	Finnish	Tammerfors
Tara'bulus Shām	—	Arabic	Tripoli
Tauris	—	Italian	Tabriz
Tekir Dagh	—	Turkish	Rodosto
Temes	te'mesh	Magyar	Tamiš
Temesvár	temeshvar'	Magyar	Temišvar, Timisioara
Temišvar	temisvar'	Slovenian	Temesvar
Termonde	—	French	Dendermonde
Te'tovo	—	Slovenian	Kalkandelen
Theiss / Teiss	tais	German	Tisa
Tienen	ti'nen	Flemish	Tirlemont
Tiflis'	—	Russian (conv.)	Tpilisi
Timisioa'ra	—	Roumanian	Temesvár, Temišvar
Tirlemont	—	French	Tienen
Ti'sa	—	Slovenian	Theiss, Teiss
Tisza	tisa	Magyar	Tisa, Teiss
Tivar'	—	Albanian	Antivari, Bar
Tongern	tong'ern	Flemish	Tongres
Tongres	—	French	Tongern
Tpilisi	tepi'lisi	Georgian	Tiflis
Traù	—	Italian	Trogir
Trau'tenau	—	German	Trutnov
Tre'bizond	—	Turkish (conv.)	Bondos
Trencsen	trenchen	Magyar	Trentschin
Trentschin	trenchin	German	Trencsen
Trèves	trev	French	Trier
Trier	trir	German	Trèves
Tries'te	—	Italian	Trst
Tri'poli	—	Italian (conv.)	Tarābūlūs Shām
Tro'gir	—	Croatian	Traù
Trop'pau	—	German	Opava
Trst	trest	Slovenian	Trieste
Trsteno	treste'no	Croatian	Cannosa
Trut'nov	—	Czech	Trautenau
Tsingtao	—	Chinese	Seito, Tsingtau, Chingtao
Tsingtau	—	German	Tsingtao, Seito, Chingtao
Turku	—	Finnish	Åbo
Tyre	tair	Arabic (conv.)	Sur, Zor
Učka	uchka	Slav	Monte Maggiore

NAME	PRONUNCIATION	LANGUAGE	EQUIVALENT
Ugliano	ulya'no	Italian	Ugljan
Ugljan	ugl'yan	Croatian	Ugliano
Ujvidek	uividek'	Magyar	Novi Sad, Neusatz
Ulbo	—	Italian	Olib
Ulcinj	ultsin'	Slovenian	Dulcigno
Uleåborg	ul'eobor	Swedish (conv.)	Oulu
Ungvár	—	Magyar	Užhorod
Ur'mia	—	Armenian	Urúmieh Rumiya
Uru'mieh Uru'miyeh	—	Persian	Urmia, Rumiya
Üsküb	—	Turkish	Skoplje
Üsküdar	—	Turkish	Skutari (Asia Minor)
Ust Dvinsk	—	Russian	Dünamünde
Usti	—	Czech	Aussig
Uusikaupunki	—	Finnish	Nystad
Užhorod	uzh'horot	Czech	Ungvár
Vács	vach	Magyar	Waitzen
Vaasa	—	Finnish	Vasa
Vág	—	Magyar	Waag
Valo'na	—	Italian (conv.)	Vlore, Avlon, Avloniya
Várásd	varasht	Magyar	Varaždin
Varaždin	varazh'din	Croatian	Várásd
Varsa'via	—	Spanish	Warsaw
Varso'via	—	Italian	Warsaw
Varsovie'	—	French	Warsaw
Vasa	—	Swedish	Vaasa
Veglia	ve'lya	Italian	Krk
Veles	—	Serbian	Köprili
Ventspils	—	Lettish	Windau, Vindava
Versecz	vershets	Magyar	Vršac
Veurne	vör'ne	Flemish	Furnes
Viborg	vi'bor	Swedish	Viipuri
Vidin	—	Bulgarian	Widdin
Viipuri	—	Finnish	Viborg
Villach	vil'lakh	German	Beljak
Vinda'va	—	Russian	Windau (German), Ventspils (Latv.)
Vis	—	Croatian	Lissa
Vis'tula	—	English (conv.)	Wisła, Weichsel
Vliss'ingen	—	Dutch	Flushing
Vlore	—	Albanian	Valona, Avlon, Avloniya
Voden	—	Slovenian	Vodena
Vo'dena	—	Greek	Voden
Vodnjan	vodnyan'	Slav	Dignano
Vos'poros	—	Greek	Bosporus, Bosfor, Boghaz Ichi
Vršac	vershats	Slovenian	Versecz
Waag	vag	German	Vág
Waitzen	vai'tsen	German	Vacs
Warszawa	varshava	Polish	Warsaw
Waveren	va'veren	Flemish	Wavres
Wavres	vavr	French	Waveren
Weichsel	vaik'sel	German	Vistula, Wisła

Name	Pronunciation	Language	Equivalent
Weisskirchen (Moravia)	vaiskĭr'khen	German	Hranice
Weisskirchen (Roumania)	vaiskĭr'khen	German	Bela Crkva, Fehértemplom
Widdin	vidin	German	Vidin
Windau	vin'dau	German	Ventspils, Vindava
Wisła	vis'wa	Polish	Vistula, Weichsel
Yaniya	—	Turkish	Yannina, Janina
Yan'nina	—	Greek (conv.)	Janina, Yaniya
Yaroslav	—	Ukraine	Jarosław
Yassy	yashi	conv.	Iaşi
Yeni Zagra	—	Turkish	Nova Zagora
Yentai	—	Chinese	Chefoo, Chihfu
Yeraskh	—	Armenian	Araxes, Araks, Aras
Yerznka	—	Armenian	Erzinjan
Ypern	i'pern	Flemish	Ypres
Ypres	ipr	French	Ypern
Yugoslavia	—	conv.	Jugoslavija
Zadar	—	Slovenian	Zara
Zagorje	zagor'ye	Slovenian	Sagor
Zágráb	—	Magyar	Agram, Zagreb
Zagreb	—	Slovenian	Agram, Zágráb
Zara	dza'ra	Italian	Zadar
Zemun'	—	Slovenian	Semlin, Zimony
Zengg	tseng	German	Senj, Segna
Zimony	zimon'	Magyar	Zemun, Semlin
Znaim	tsnaim	German	Znojmo
Znojmo	znoimo	Slavonic	Znaim
Zor	—	Hebrew	Tyre, Sur

INDEX

THE numbers refer to pages ; those in black type are to passages that contain more than an incidental mention of the subject of reference.

Names not found in the index should be looked for in the list of Alternative Geographical Names immediately preceding. Conventional abbreviations are occasionally used to save space, as, *e.g.* Mts. = Mountains ; Penin. = Peninsula ; pop. = population ; temp. = temperature.

Printed in England at THE BALLANTYNE PRESS
SPOTTISWOODE, BALLANTYNE & CO. LTD.
Colchester, London & Eton